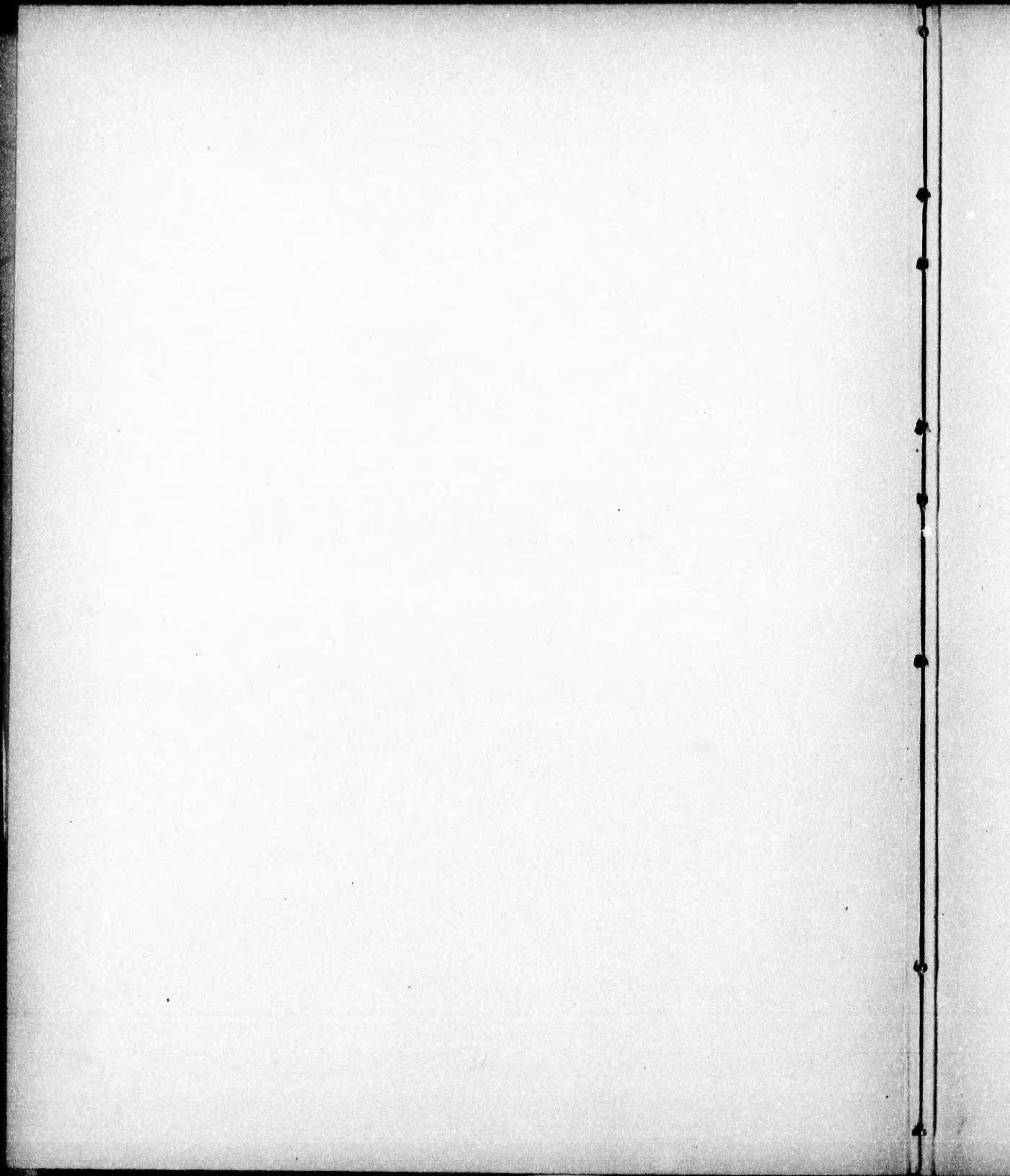
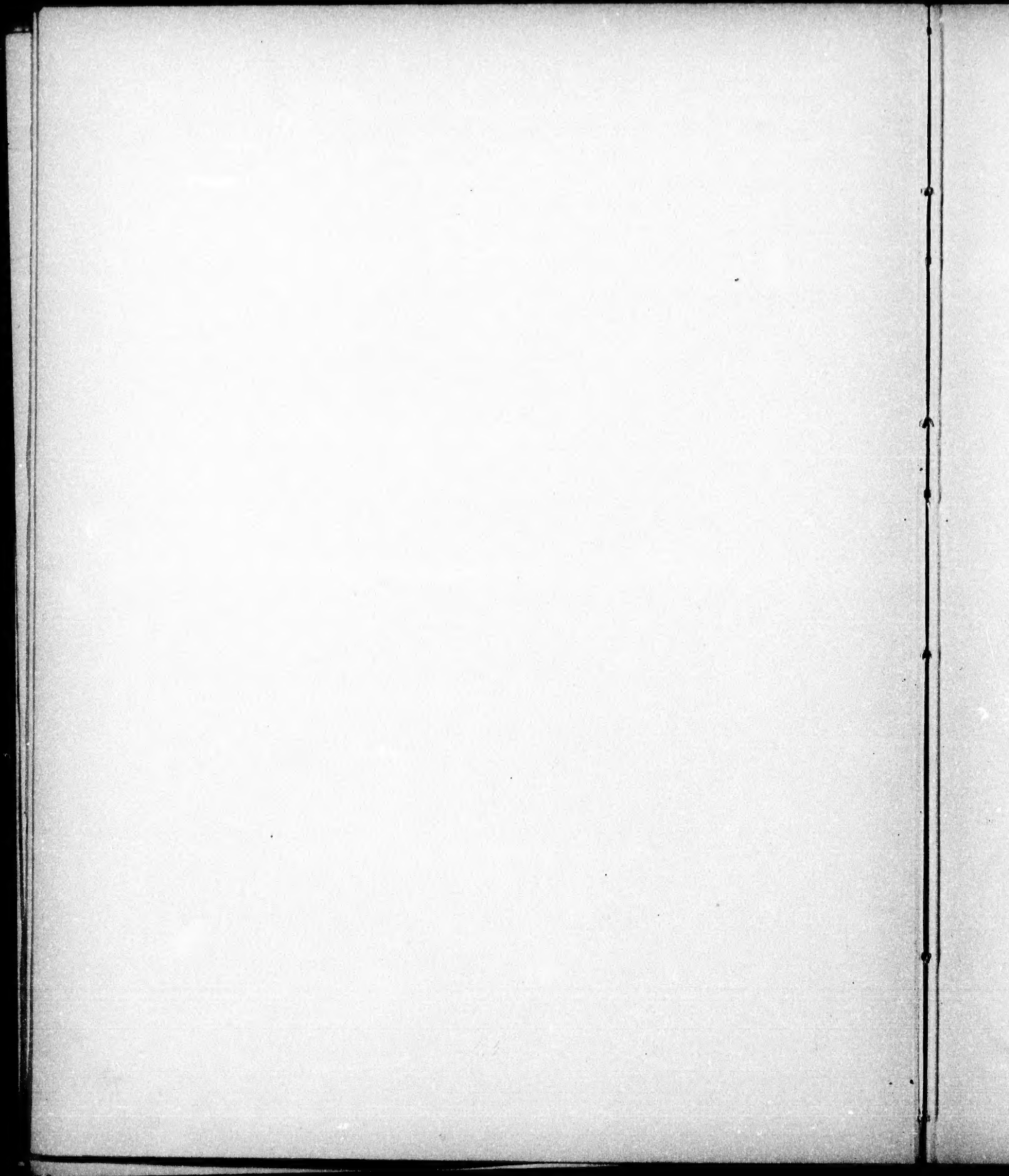




FLOWERS OF THE FIELD AND FOREST.



FLOWERS
OF THE
FIELD AND FOREST.

FROM
Original Water-Color Drawings after Nature,
By ISAAC SPRAGUE.

DESCRIPTIVE TEXT BY REV. A. B. HERVEY.

WITH EXTRACTS FROM
LONGFELLOW, LOWELL, BRYANT, EMERSON, AND OTHERS.

BOSTON
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ILLUSTRATIONS.

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BLOOD-ROOT.

I HAVE seen

A curious child, who dwelt upon a tract
Of inland ground, applying to his ear
The convolutions of a smooth-lipped shell.
To which, in silence hushed, his very soul
Listened intensely; and his countenance soon
Brightened with joy; for from within were heard
Murmurings, whereby the monitor expressed
Mysterious union with its native sea.

Even such a shell the universe itself
Is to the ear of Faith; and there are times,
I doubt not, when to you it doth impart
Authentic tidings of invisible things;
Of ebb and flow, and ever-during power;
And central peace, subsisting at the heart
Of endless agitation. Here you stand,
Adore, and worship, when you know it not;
Pious beyond the intention of your thought;
Devout above the meaning of your will.

Wordsworth.



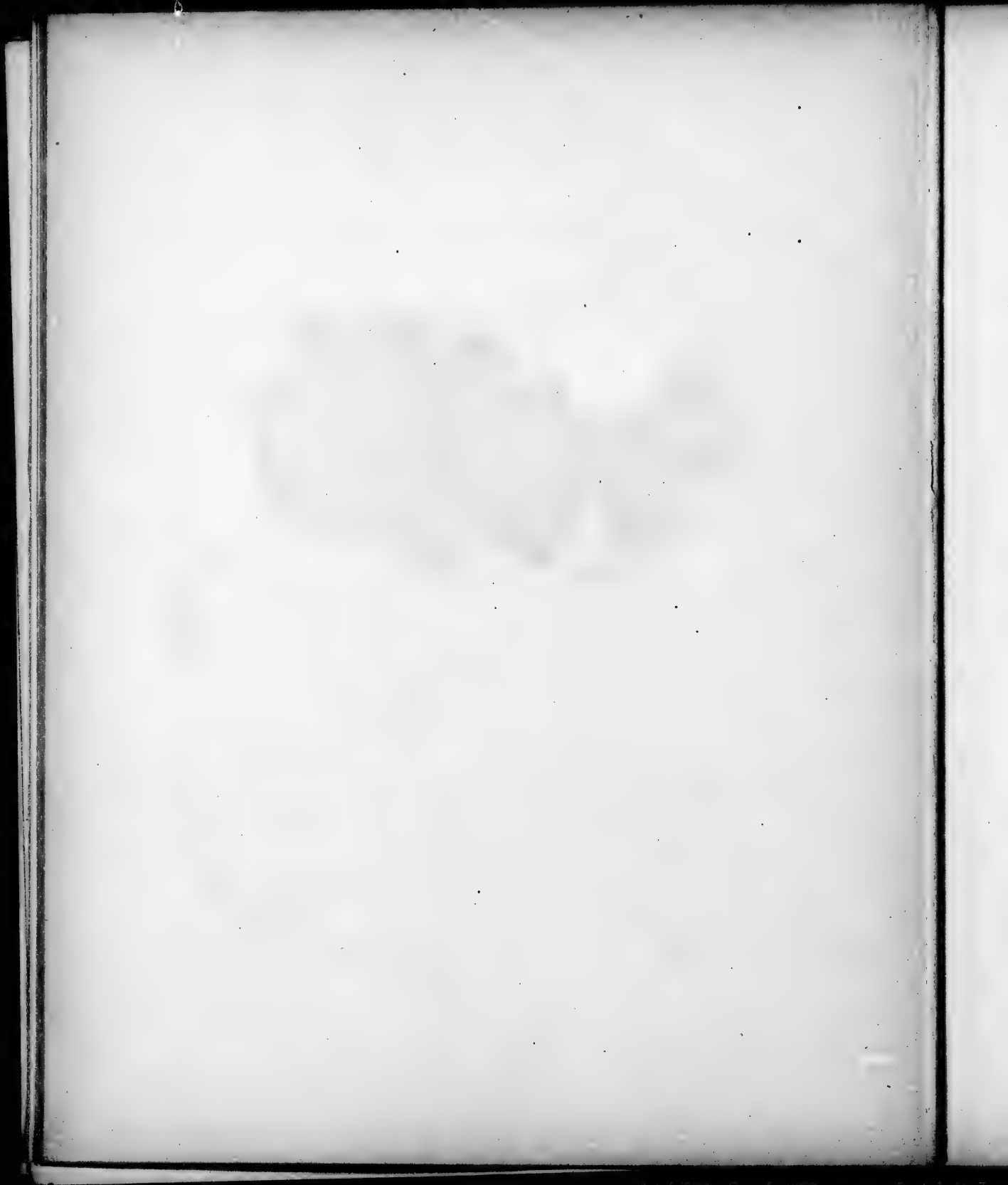
I HAVE SEEN

A simple child, who, down upon a tract
Of island ground, opening to his ear
The rustling of a smooth-shelled shell,
In which, as waves washed, his very soul
Listened intensely, and his countenance soon
Brightened with joy: for from within were heard
Murmurings, whereby the monitor expressed
Mysterious union with its native sea.

Even such a shell the universe itself
Is to the ear of Father: and there are times,
I doubt not, when to you it doth impart
Authentic tidings of invisible things:
Of ebb and flow, and strengthening power;
And central power, subsiding at the heart
Of divine aspiration. Then, the wind,
A voice, and whispering, which you hear it not;
There is, in the air, the power of thought:
Heaps upon the meaning of your will.

Wordsworth.





BLOOD-ROOT.

SANGUINARIA CANADENSIS L.

How fresh, O Lord, how sweet and clean
Are thy returns! even as the flowers in Spring;
To which, besides their own demean,
The late-past frosts tributes of pleasure bring.
Grief melts away
Like snow in May,
As if there were no such cold thing.

Who would have thought my shrivelled heart
Could have recovered greenness? It was gone
Quite under ground; as flowers depart
To see their mother-root, when they have blown;
Where they together,
All the hard weather,
Dead to the world, keep house unknown.

And now in age, I bud again,
After so many deaths I live and write;
I once more smell the dew and rain,
And relish versing: O my only light,
It cannot be
That I am he
On whom thy tempests fell all night.

Herbert.

FLOWERS OF THE FIELD AND FOREST.

NATURE also is an artist and an author. She paints the flowers before we copy them, and writes their simple story for us to tell again. We have put upon the first page of our book a charming flower, which she also displays upon the opening leaves of the great floral book of the year. The story of its modest life is not a long or a startling one, but perhaps it has a cheery word of hope, which weary, wintry hearts, longing for spring, may be glad to hear.

In the very early April days, which in our New England clime are not over likely to be sunny days, before the leaves come out at all upon the trees, when the downy catkins are first showing the revival of life in the willows by the brook-side, before any green thing yet gladdens the eye in field or forest, and the brown dead grass and the brown dead leaves cover all the ground, then it is that in the edges of the moist, rich woods the *Sanguinaria* puts up its slender stem, crowned with its circlet of petals dazzling white. It is a most beautiful flower, and, to my thoughts, a beautiful emblem of nature's Easter, its pure whiteness having something more than the earthly in its unstained loveliness. It seems almost to have lived its earthly course, and passing through the disrobing room of Death, which —

"has left on her
Only the beautiful."

comes now as the promise, radiant and heavenly, of that touch of the Infinite Life by which all the dead are quickened.

It is not easy to say why we see in all these beautiful forms of nature these hidden meanings, and delight to trace in them a likeness to our deeper thoughts and experiences. Are these

BLOOD-ROOT.

similitudes mere fanciful semblances, or are they indications that our clearer consciousness is but the sign of a universal life, which, after its kind, is conscious in every thing? Are the mental and material worlds after all but separate rooms in the one house of Life, divided by a thin, flexible partition, so that a moving breath in the one palpitates through the other in correlations of conscious thought? Who shall say? Still it remains true that we like to see our own thoughts and feelings mirrored in the larger doings and happenings of the Kosmos. We love that poet best who best humanizes nature, and finds a present counterpart of himself in the dumb life around him; who, without seeming to exceed probability, or distort natural functions, discovers emotions in things which we have known in ourselves. We love his message most who puts his ear to the natural universe as to

“The convolutions of a smooth-lipped shell,”

and then tells us of

“Authentic tidings of invisible things,
The central peace subsisting at the heart
Of endless agitation.”

which it murmurs to his listening soul.

So I am sure quaint George Herbert speaks to wide acceptance when he finds in the coming forth of the flowers in early spring from their abode “quite underground,” where they have gone “to see their mother-root;” and

“Dead to the world, keep house unknown
All the hard weather,”

a deep illuminating correspondence with that most precious

FLOWERS OF THE FIELD AND FOREST.

spiritual experience, when the shrivelled heart, "on which tempests fell all night," has "recovered greenness," and

"Smells the dew and rain,
And buds again."

For nature teaches no sweeter lesson than when, with floral symbols, it repeats from year to year, to a sinful and mortal world, the pictured hope of man's moral and material rebuilding. And the Sanguinaria, with its blood-red root under ground, and its pearly purity up in the April air, may rightly speak a word of hope to those who in obscurity and darkness have all their lives distilled only bitter tears, like drops of blood, from the griefs and defilements of their lot. For with it what a beautiful white soul has blossomed from a root-life so ensanguined and bitter! How greatly is it like those souls about the Throne "which have come out of great tribulation, and have washed their robes and made them white in the blood of the Lamb."

The poet's quaint fancy of flowers, "keeping house" all the winter long, underground, finds plenty of illustrations in the real life of many plants, notably in this one. The housekeeping, however, does not use up in the winter what has been garnered in the summer. It only just preserves it for the early needs of the plant at the beginning of the next season, before it shall have time to draw anew from nature's great supplies. Through the long summer its broad, roundish leaves are opened and lifted up to the sun and rain, and with patient industry gather out of the air and dew stores of invisible food. These, mingling with the nutritious elements which its fine rootlets have sucked from the moistened soil, have been slowly elaborated and laid away in the red root-stalk, lying

BLOOD-ROOT.

like a hidden storehouse underground. So when the warm spring sun melts the locks and chains of frosty winter, and sets free the whole imprisoned kingdom of plants, none are sooner ready to come forth and smile a welcome to the great Liberator than the red-footed, white-breasted *Sanguinaria*.

The flower stays not long, and the plant, after producing the early harvest of seeds, surrenders, as just now indicated, most of the growing season to the prudent accumulation of sustenance for next year's flowering and fruit bearing. So it makes to-day render tribute to to-morrow, as to-day itself is in part the product of yesterday. Thus its little life links its generations together with mutual helpfulness, and mingles the common and popular blessing of receiving with the greater blessedness of giving.

Concerning the blood-red liquid which freely exudes when the stem or root-stalk is cut or broken, and which gives the popular as well as the scientific name to *Sanguinaria*, Prof. Goodale says: "In the case of nearly all plants from which a white or colored juice exudes, there is a special system of microscopic canals, consisting either of branched cells or confluent tubes, termed the Latex system. Thus in the *Euphorbias*, Lettuce and Poppy, the milky juice is contained in communicating Latex-tubes. But in some other cases, for example blood-root, the colored juice is held in receptacles of a different character. In blood-root these special receptacles are roundish or more elongated, and possess very thin walls. While some of these sacs or cells are separated from each other, others are arranged in rows. This grouping into linear series is well marked in the more superficial parts." The colored juice of the *Sanguinaria* was used by the Indians as a dye.

FLOWERS OF THE FIELD AND FOREST.

Having referred to this plant as our sweetest floral emblem of nature's Easter, I cannot refrain from quoting a few stanzas from Phœbe Cary's well known lines, "Resurgam," in which she fortifies her own heart, at the approach of death, by this hope which nature in the early spring so brightly illuminates:

Nature's sepulchre is breaking,
And the earth, her gloom forsaking,
Into life and light is waking.

Oh, the weakness and the madness
Of a heart that holdeth sadness
When all else is light and gladness!

Shall not He who life supplieth
To the dead seed, where it lieth,
Quicken also man, who dieth?

Rise, my soul, then, from dejection,
See in nature the reflection
Of the dear Lord's resurrection.

Let this promise leave thee never:
"If the might of death I sever,
Ye shall also live forever!"

blem of
as from
he for-
which

THE PASTURE THISTLE.







THE PASTURE THISTLE.

CNICUS PUMILUS Torrey.

THE THISTLE FLOWER.

My homely flower, that blooms along
The dry and dusty ways,
I have a mind to make a song,
And make it in thy praise;
For thou art favored of my heart,
Humble and outcast as thou art.

Though never with the plants of grace
In garden borders set,
Full often have I seen thy face
With tender tear-drops wet,
And seen thy gray and ragged sleeves
All wringing with them morns and eves.

Albeit thou livest in a bush
Of such unsightly form,
Thou hast not any need to blush—
Thou hast thine own sweet charm;
And for that charm I love thee so,
And not for any outward show.

Alice Cary.

I NEED hardly make a point of formally introducing the Thistle to my readers. It has a faculty of pointedly introducing itself, and,

FLOWERS OF THE FIELD AND FOREST.

notwithstanding the humane admiration of our poet for this bristling denizen of the pastures, most people do not care for a very close or intimate acquaintance with it. I may say, however, that among botanists it is spoken of as belonging to the large tribe of composite flowers. The admirable picture by Mr. Sprague tells more of it at a single glance than could be conveyed by pages of description. It is in flower all summer, and may be found, in the latitude of New England and Pennsylvania, as far West as the Mississippi. Though so common, and so obnoxious as a weed, that few ever take any interest in it, it is not to be denied that it possesses a certain kind of attractiveness. In the artist's eye, its rich, red blossom, and its curiously cut and jagged leaves, are not without their elements of beauty. It has been made to serve ornamental if not useful ends, for it was early seized upon by the architect and designer as the basis of much fine ornamentation both in colors and in carvings.

Prof. Hulme says: "The Thistle has been largely employed in ornamental art, in some cases clearly for its own inherent beauty; in others as clearly from its heraldic and historic associations. A very beautiful example of it may be seen in a square panel in the Cathedral of Bruges, and again in the moulding on a tomb of Don Juan II., in that building; in numerous wooden panels (Gothic carvings) in the South Kensington Museum; and on the monument of Mary Queen of Scots, in Westminster Abbey."

It is best known, perhaps, as the national emblem of Scotland, but how it came to be such, or what particular species of it first furnished the sturdy Scotchmen with their symbol, is much in dispute among the antiquarians and naturalists. In

THE PASTURE THISTLE.

any case it was not probably the one figured in our plate. Various legends undertake to account for its becoming the national symbol, and of course throw the origin of it far back into the past. This is one story: "When the Danes invaded Scotland, it was deemed unwarlike to attack an enemy in the darkness of the night instead of a pitched battle by day; but on one occasion the invaders resolved to avail themselves of stratagem, and, in order to prevent their tramp being heard, marched barefooted. They had thus neared the Scottish camp unobserved, when a Dane unluckily stepped upon a sharp thistle, and uttered a cry of pain, which immediately aroused the Scotch, who discovered the stealthy foe, and defeated them with great slaughter. The thistle was immediately adopted as the emblem of Scotland." For as good a reason Rome might have adopted the goose as its national bird, for did not a flock of cackling geese, on a like occasion, save Rome? There is, however, no authentic record of its appearance in Scottish history in this relation earlier than 1458, when it is referred to in an inventory of the property of James III., of Scotland, as "a covering of variand purpir tarter browdin with thrissils and a unicorn," the unicorn being also an emblem of Scotland.

The Scottish knighthood, the Order of the Thistle, is of comparatively late origin. James I. of Great Britain, who was also James VI. of Scotland, on his accession to the throne of the United Kingdom, took as his badge a compound flower, half rose and half thistle, and the stalk supporting this floral monstrosity had on one side of it a rose leaf and on the other the leaf of a thistle.

If national emblems are emblematic, as I suppose, strictly

FLOWERS OF THE FIELD AND FOREST.

speaking they are not, I can scarcely see why the Thistle should stand for the "Cannie Scot." There are, to be sure, points of resemblance, but they are quite superficial. The national motto, *apropos* of the emblematic Thistle, "*Nemo me impune lacessit*,— No one provokes me with impunity," might indeed hint at the pugnacious quality of the Scotch, especially in the matter of metaphysical theology; and the sharp points with which the Thistle always bristles may be no inapt symbol of the natural acuteness of the Scotchman's mind, and the native keenness of his wit. But underneath all, in him there is a rich store of hearty, genial humanity and kindliness, which find no adequate symbol in the burly thistle.

Like everything else associated with his native land, it was dear to the heart of Burns, who meeting it in his farm work, says, —

"The rough burr thistle spreading wide
Among the bearded bear,
I turned the weeder-clips aside
And spared the symbol dear."

The early bad reputation of the Thistle among English speaking people, is obvious from its being made to figure so prominently in the "primal curse," pronounced upon the ground when Adam sinned in Eden, as related in our English Bible. "Cursed is the ground for thy sake. Thorns also, and thistles shall it bring forth to thee." It is not known what plants are here referred to, but the use of this word shows the real opinion our translators had of this well known English weed. It hasn't many friends, that is certain, and for the best of all reasons. It is not friendly. It has a sort of touch-me-not attitude toward all the world. It

THE PASTURE THISTLE.

has its virtues, no doubt, but they are not of the pleasing or conciliatory kind. If people want to admire it for what it has of worth or beauty, well and good, they may stand off and admire. If they don't, it is all the same to the thistle. It is bound to stand on its own feet, defend its own rights, and occupy its own place, let the world wag as it may. There seems to be a certain sturdiness of moral character about it which is not unlike what we find in similar independent, thistly, strongly individualized, and not very agreeable human mortals. They are here, and here to stay, and to take care of their own, not without pugnacity, giving and taking thrusts. The world may be pleased or displeased, it matters little to them; and the rest of us console ourselves by thinking about them, "Oh, well, it takes all sorts of people to make a world."

While something may be said in a general way in behalf of this friendless weed, I should not expect to make it a favorite with the farmer. He is blinded by prejudice, a prejudice, however, not altogether without some good grounds; for this plant yields food neither to himself nor his beast, and it absorbs much of the vital strength of the soil which ought to go to nourish his grain or his grass. Besides, I have no doubt he carries the memory of many sharp and painful thrusts which it has given him when he has taken it up unawares with his sheaves of wheat or oats.

But the most interesting thing about the Thistle is the ingenious way by which it contrives to scatter its seed,—just as though there wouldn't be thistles enough for all practical purposes if the seeds were left to take their chances of planting by wind and weather. Nature has contrived for every one of its

FLOWERS OF THE FIELD AND FOREST.

myriad seeds an airy little balloon, of the finest and lightest down, and it goes sailing away upon the wings of the wind like another Montgolfier, whose famous æronautics, indeed, this flying plant antedated many ages. Who ever saw a sunny summer day in the country when there were not multitudes of these fairy globes, each with an embryo plant in its breast, sailing lazily through the sultry air! What images of lightness and grace are these airy nothings from the thistle's white crown! They will sail on and on, till the rain beats the buoyancy out of their wings, and then they will come down with the raindrop, and be planted far away from their native fields.

I suppose most seeds are left to the ordinary chances of the elements for dispersion and planting, but many of them are furnished with special appliances for it. Some of these are purely mechanical, the pod in which they grow being so contrived that as it ripens it brings its sides into a state of tension, which increases as the growth and ripening goes on, till at last it bursts open with a sudden and violent spring which scatters the seeds in every direction, sometimes many feet away.

Then, again, other seeds are provided with barbed points, or with sharp hooks which readily seize upon any passing object, as the wool and hair of animals, perhaps the feathers of birds, certainly the clothing of men, and are thus carried long distances from their native home. Others, like the seeds of the maple and trumpet-flower, have their gossamer wings, by which they "fly away to be at rest" in some distant, hospitable soil.

Many, like the thistle and dandelion, are furnished with buoyant envelopes of feathery fibre, which make them the sport of every breeze. This device, by which Nature disperses the seeds

THE PASTURE THISTLE.

of some of the humblest of its creatures, is of the greatest importance to man in at least one case, for the downy fibre which in the open boll covers the black seed of the cotton plant, clothes also the whole civilized race of man, and is the foundation of one of the chief and most astonishing industries of modern times.

The water-lily, which produces its seeds beneath the surface of the water, has a curious contrivance for dispersing them. It encloses them in a light, thin bag, which is filled with air, and is impervious to water. This acts as a float or life-preserver to the seed, which, directly it is released from the mother plant, rises to the surface and floats away, "driven by the winds and tossed," or carried by the currents of water. By and by the sack bursts or decays, and the seed immediately sinks and is embedded in the mud at bottom, and is ready to produce a new plant in a new place. The plant world is full of these ingenious contrivances. But it is time we permitted our poet to tell the reason why she takes the thistle to her kindly regard.

Thou hast no lovers, and for that
I love thee all the more;
Only the wind and the rain to be
Thy friends, and keep thee company.

So, being left to take thine ease
Behind thy thorny wall,
Thy little head with vanities
Has not been turned at all,
And all field beauties give me grace
To praise thee to thy very face.

FLOWERS OF THE FIELD AND FOREST.

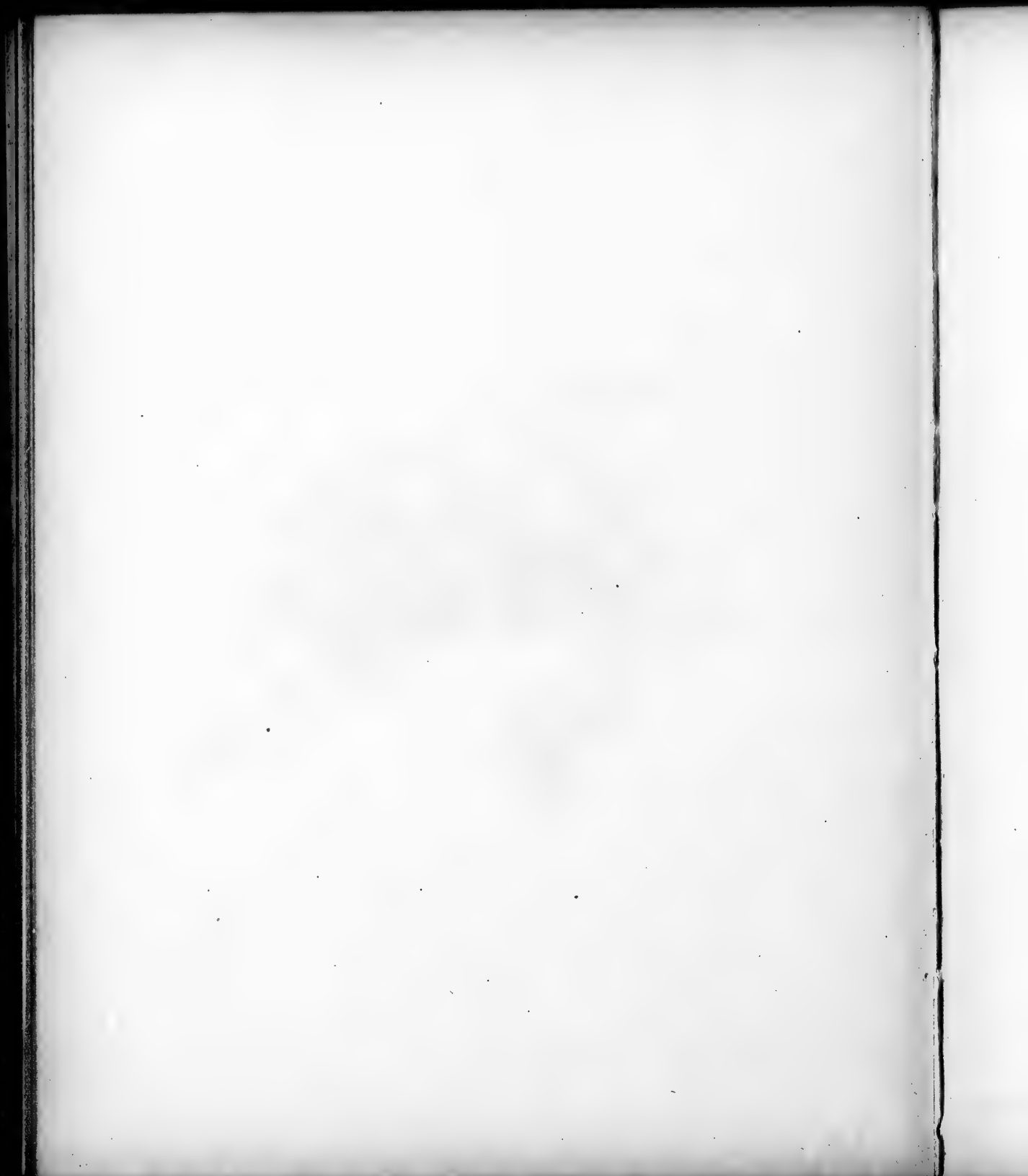
So thou shalt evermore belong
To me from this sweet hour,
And I will take thee for my song,
And take thee for my flower,
And by the great, and proud, and high,
Unenvied, we will live and die.

Alice Cary.

THE PARTRIDGE-BERRY.







PARTRIDGE-BERRY.

MITCHELLA REPENS L.

SPRING, with that nameless pathos in the air
Which dwells with all things fair,
Spring, with her golden sun and silver rain,
Is with us once again.

In the deep heart of every forest tree
The blood is all aglee,
And there's a look about the leafless bowers
As if they dreamed of flowers.

Yet still on every side we trace the hand
Of winter in the land,
Save where the maple reddens on the lawn
Flushed by the season's dawn.

Or where, like those strange semblances we find
That age to childhood bind,
The elm puts on, as if in Nature's scorn,
The brown of autumn corn.

As yet the turf is dark, although you know
That, not a span below,
A thousand germs are groping through the gloom
And soon will burst their tomb.

Henry Timrod.

FLOWERS OF THE FIELD AND FOREST.

THIS is by no means a spring flower, for it opens its delicate little twin blossoms of pink in the hot days of June and July. But I suppose the plant is associated in the minds of most lovers of nature with the memory of the very earliest sunny days of the year, for amidst the universal brown of early spring, its bright evergreen leaves, and its brilliant red berries, are almost the only things which gladden the weary eyes with bits of pleasing color. Here and there a little bank or tuft of moss, or a frond of rock-fern, adds its greenness, and shares with the Partridge-Berry the gratitude of eyes hungering for the tints of summer. Especially grateful to us is this humble plant, in the time when its shining leaves and sparkling berries peep up from their nest in the dull dead leaves, sometimes just from under the edge of the retreating snow. But in the luxuriant life and color of mid-summer it would scarcely be noticed at all, as it modestly puts up its delicate pink flowers, in some dark nook, hidden away and crowded out of sight by a mob of obstreperous weeds. As red as the plump cheeks of this little berry commonly are, it has been sometimes found as white as snowdrops. A young lady sent some white ones, two or three years ago, from York, Pennsylvania, to Dr. Gray, the first he had ever heard of, it seems.

In some parts of the country the aromatic Wintergreen, or Checkerberry, is called the Partridge-Berry, Prof. Goodale states. I am sure that in some parts of New York and Pennsylvania I have heard our plant called the Checkerberry, and in those regions, the latter name is not applied to the Wintergreen, as it is in New England. The scientific name of the plant was given to it by the great Linnæus, in honor of Dr. John Mitchell of Virginia, who, during the first half of the last century, was one of our best known

PARTRIDGE-BERRY.

botanists, and a valued correspondent of the founder of our science. He was a Fellow of the Royal Society, and is known in botanical science as the author of several short treatises on botany, which were issued in a collected form in London, in 1769. He certainly is among the most fortunate of men to have his name and memory embalmed in a plant at once so charming and so widely distributed as is the *Mitchella repens*. There is but one other species belonging to that genus, and that is found in Japan. Dr. Gray has shown, in a very interesting paper, that many of our North American forms are represented in the flora of that country. The Mayflower, or trailing Arbutus, so widely and deservedly popular in New England, is a case quite similar to that of the *Mitchella*. There is but one other species of the *Epigaea* known, and that is a native of Japan.

The most careless observer could scarcely fail to notice, that the bright red berry is furnished with a double "blow end," as though two flowers had assisted in its production. Such is the case. A single ovary bears twin flowers, which, indeed, sometimes come to be something more than "Siamese-twin" flowers, for they occasionally coalesce and form a single flower with an eight-lobed corolla. Commonly, however, they are quite separate, and fructify the corresponding segments of the compound ovary on which they grow. The flowers themselves have individual peculiarities. In some the pistil is long and stands out beyond the mouth of the little hairy tube of the corolla, while the stamens are short and are concealed somewhere down in its obscure depths. Other flowers will show an arrangement exactly the opposite of this, the pistil, with its four-parted stigma, will be short and hidden away in the tube while the stamens will protrude. It is evident that flowers, built

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on this plan, cannot conveniently fertilize themselves. The parts involved in the act seem to be thus purposely arranged, so that they cannot come in contact. It has been observed in other flowers thus constructed, that they are very nicely arranged to utilize the help of bees and other insects in cross-fertilization, for the pollen from flowers with long stamens will be placed on the insect which comes for their honey, in exactly the right position to be most easily communicated to the stigma of a flower with a long pistil. So with the flowers having short stamens, and those having short pistils.

If one looks closely he will see beneath the rows of roundish, opposite, green leaves, just at the base of the leaf-stalk, a pair of minute scales, or stipules. They seem to be of no use to the plant, nor are they ornamental. But the trained botanist sees in them great significance. They are the unmistakable signs that our little creeping vine is the "long lost and far wandered scion of a noble house." This humble denizen of our woods has aristocratic connections, and is almost our only representative of a large and influential family in the kingdom of plants, whose native home is in a more genial clime than ours,— a family distinguished in some of its members, by the most considerable and most honorable services to mankind.

I need mention but two or three of these to show that. The Coffee plant furnishes the material for a decoction which is the most universal and most delicious drink (when rightly made and rightly served) that art has yet educed from nature. In the bark of the Cinchona tree, Peruvian Bark, is found one of the most invaluable drugs employed in the art of healing, and one which, perhaps, as a defence against the subtle poisons of malaria, has

PARTRIDGE-BERRY.

saved more human lives than any other. In the pigment produced from the Madder plant, we have the basis and substance of some of our most useful dyes. These, and several other useful plants that might be named, are all first cousins to our bright little friend of the early spring time.

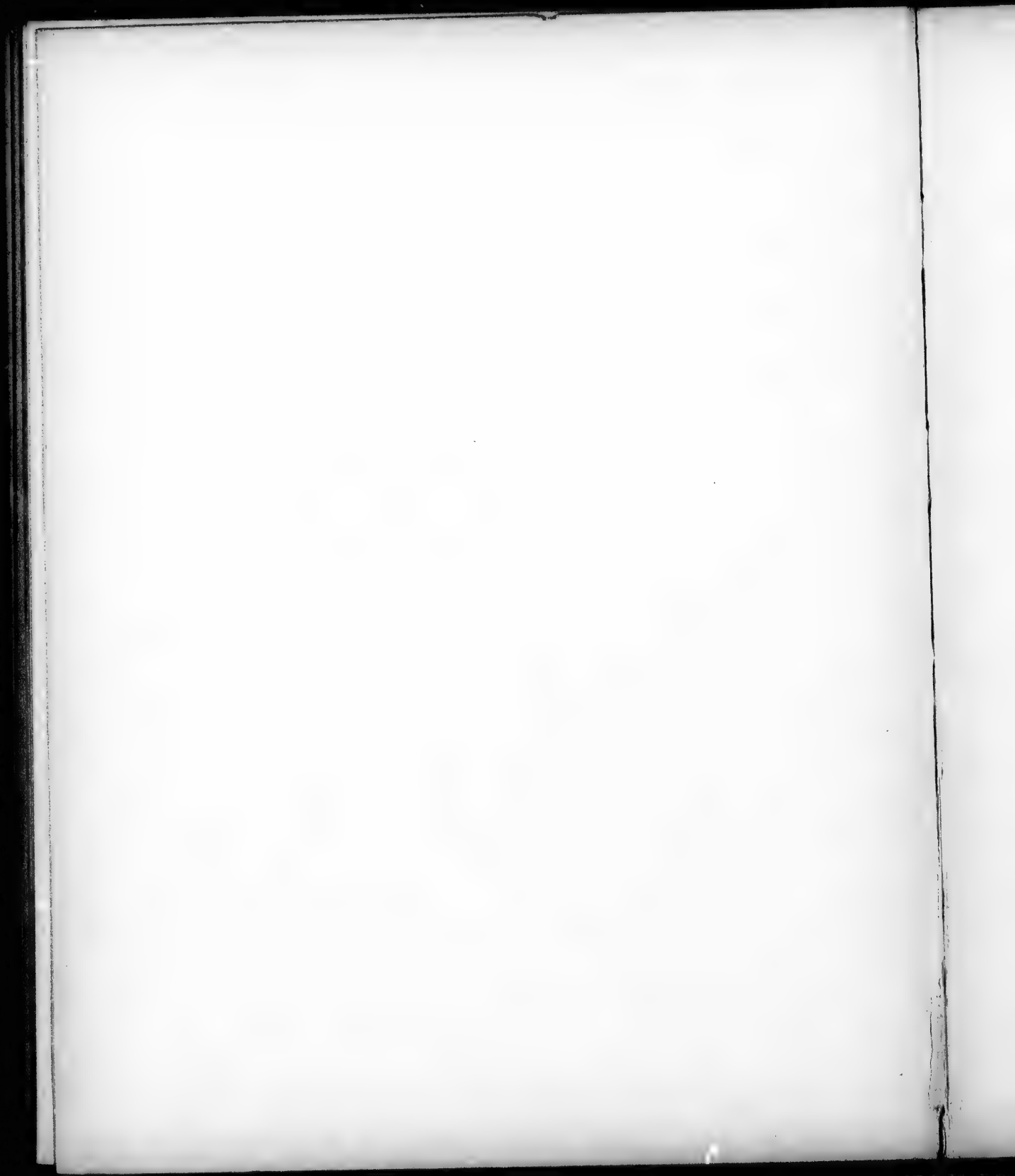
New are the leaves on the oaken spray,
New the blades of the silky grass;
Flowers, that were buds but yesterday,
Peep from the ground where'er I pass.

These gay idlers, the butterflies,
Broke, to-day, from their winter shroud;
These light airs, that winnow the skies,
Blow, just born, from the soft white cloud.

Gushing fresh in the little streams,
What a prattle the waters make!
Even the sun, with his tender beams,
Seems as young as the flowers they wake.

Children are wading, with cheerful cries,
In the shoals of the sparkling brook;
Laughing maidens, with soft young eyes,
Walk or sit in the shady nook.

Bryant.



THE PITCHER-PLANT



PITCHER-PLANT.

SARRACENIA PURPUREA L.

DEEP in the shady sadness of a vale
Far sunken from the healthy breath of morn,
Far from the fiery noon, and eve's one star,
Sat gray-haired Saturn, quiet as a stone,
Still as the silence round about his lair;
Forest on forest hung about his head
Like cloud on cloud. No stir of air was there,
Not so much life as on a summer's day
Robs not one light seed from the feathered grass,
But where the dead leaf fell, there did it rest.
A stream went voiceless by, still deadened more
By reason of his fallen divinity
Spreading a shade. The Naiad 'mid her reeds
Pressed her cold finger closer to her lips.
Along the margin-sand large footmarks went,
No further than to where his feet had strayed,
And slept there since. Upon the sodden ground
His old right hand lay nerveless, listless, dead,
Unscathed; and his realmless eyes were closed;
While his bowed head seemed listening to the Earth,
His ancient mother, for some comfort yet.

Keats.

THIS incomparable picture of a swampy vale deep in the woods, is so exactly like the native home of our purple Pitcher-

FLOWERS OF THE FIELD AND FOREST.

Plant, that I could not resist the temptation to transfer it to our pages. Mr. Meehan thinks Longfellow must have had in his thought some image or memory of our southern Pitcher-Plant when, in the song of the "Slave in the Dismal Swamp," he made this life-like picture of southern vegetation,—

Where will-o'-the-wisps and glow-worms shine,
In bulrush and in brake;
Where waving mosses shroud the pine,
And the cedar grows, and the poisonous vine
Is spotted like the snake;

Where hardly a human foot could pass,
Or a human heart would dare,
On the quaking turf of the green morass
He crouched in the rank and tangled grass
Like a wild beast in his lair.

Be this as it may, our plant is common all along our eastern border from Newfoundland to Florida, growing in bogs and swampy places, and flowering in the early summer. This plant introduces us to one of the most interesting fields of biological inquiry that has been opened in many a day. I refer to that curious instance, which these and some other plants illustrate, in which the vegetable kingdom seems to reverse the ordinary course of nature and makes reprisal upon the animal kingdom for its habitual foraging. In this as in many other departments of research the interest has been greatly quickened, almost created, throughout the scientific world, by the magic touch of that one master spirit of the century, Charles Robert Darwin,—now alas, no more of earth! His monograph on Insectivorous Plants marks an era in this department of botanical science.

THE PITCHER-PLANT.

Insectivorous plants are a group or physiological assemblage of plants which belong to a number of distinct natural orders. "They agree in the extraordinary habit of adding to the ordinary supplies of nitrogenous material afforded them in common with other plants by the soil and atmosphere, by the capture and consumption of insects and other small animals. The curious and varied mechanical arrangements by which these supplies of animal food are obtained, the way and degrees in which they are utilized, and the remarkable chemical, biological and electrical phenomena of prehension and utilization can only be fully understood by a separate and somewhat detailed account of the leading orders and genera."

To give that would not come within the purpose of this paper, and yet I think I may be able to embody enough of this strange knowledge to give my readers some adequate idea of what happens when a plant devours "insects and other small animals."

Take for example the common Sun-dew, *Drosera rotundifolia*, of our bogs and swamps. It has a circle of long-stemmed round leaves which spring out horizontally from the bottom of the flower stalk near the ground. These leaves, which are not usually over half an inch diameter, are covered pretty thickly above with flexible hairs, or tentacles, to the number of two hundred and fifty or more, not longer than two-thirds of the diameter of the leaf. Each of these tentacles bears at top a transparent drop of viscid glistening fluid which looks very like a drop of dew in the early sunshine. This gives the plant both its popular and its scientific name.

Insects seem to be attracted to the leaves of this plant, perhaps by its glistening appearance, perhaps by its odor or color, or by all combined. But if they come too near, or dare to light upon its

FLOWERS OF THE FIELD AND FOREST.

brilliant leaves, they will get anything but a friendly welcome. A fly coming in contact with the viscid end of the tentacles finds itself stuck fast. He cannot get away even if but two or three of these silvery dewdrops touch him. But his struggles to do so awaken the active interest of all the neighboring tentacles, which immediately bend over toward him and fix upon him their adhesive tops. In fact an impulse seems to be spreading over the whole surface of the leaf, which sets all the parts into sympathetic activity. The leaf itself soon hollows under the victim and rolls up its edges, and thrusts down upon him more and more of its animated bead-topped hairs. Slowly he is pressed down upon the surface of the leaf, drenched in the abundant fluid which the leaf and its tentacles secrete, and in a quarter of an hour or so he is dead.

But the leaf does not stop there. It holds its dead prey in its close embrace till it has fully digested him, for its tentacles and its superficial cells and glands constitute a true stomach, which secretes digestive fluids and deals with animal substances in exactly the same way that the animal stomach does. The nutritious resultants of this digestive process are absorbed into the tissues of the plant and help to nourish it. A chemical analysis of the fluids produced in this vegetable stomach, and a careful observation of their action upon all nitrogenous substances which ordinarily constitute the food of animals, show that in almost all respects it runs in an exact parallel with the functions of that organ in the animal economy. It appears to be strictly carnivorous, as it will not digest vegetable or purely carboniferous substances, such as gum-Arabic, sugar, starch, olive oil, etc. We have then here the leaf of a plant possessing a true animal function.

THE PITCHER-PLANT.

The Venus Fly-trap, *Dionæa muscipula*, a native of southeastern North Carolina, is another carnivorous plant. At the extremity of its obcordate leaves, are two lobes standing at something less than a right angle to each other, hinged together at the back upon the prolonged midrib of the leaf. The edges of these lobes are armed with long spines which shut by and between each other when the lobes close. Each of the lobes has three slender, sharp, sensitive hairs placed triangularly some little distance apart upon its inner surface. The slightest touch upon either of these hairs, as the lighting upon it of the smallest insect, or brushing it with their wings, or touching it with their legs or bodies as they crawl over the surface, causes the lobes to shut together like a trap, instantly imprisoning the unwary victim. If he be not too large to pass between the closed teeth at the edge of the lobes he may escape. Otherwise he is doomed, for the leaf immediately pours out upon him from glands specially provided an abundance of digestive fluid which soon kills and dissolves him.

As with the Sundew so with the *Dionæa*, a true digestive process takes place perfectly analogous to that in the animal economy and the plant gets much nourishment from this source of food supply. It has been observed that plants provided with this special adaptation for securing food have smaller roots than other kinds of plants not so furnished. There are several other genera of plants that possess this extraordinary function, which we have heretofore considered an exclusive attribute of animal life.

But in the *Sarracenia* we have the case of plants adapted to capture and devour insects, but with no ability truly to digest them. While they entrap and destroy great numbers of them and are obviously contrived especially to do that, they make use of them

FLOWERS OF THE FIELD AND FOREST.

as nourishment in a way more analogous to the processes of plant life than do the *Drosera* and *Dionaea*.

We are indebted to an admirable study of *Sarracenia variolaris*, published in 1874, by Dr. Mellichamp of South Carolina, for the best report yet made of the insect-capturing habit of the Pitcher-Plant. The species above-named is larger than the one so accurately represented in our plate. It has yellow flowers, and the trumpet-shaped "pitcher" is from ten to twenty inches long, and is covered at top with an overarching hood which quite effectually excludes the rain. It grows common in the South and is often transplanted into the house to serve as a domestic fly-trap. It is furnished with the necessary appliances for capturing insects in this way. Along the leaf border or wing of the pitcher quite down to the ground are secreted at regular short intervals drops of a sweet liquid which is very palatable to flies, ants, bugs, and other insects. These make a baited path, or honey-trail straight up the leaf to the open mouth of the pitcher at top. Around the margin of the mouth and well down the interior the sugary drops exude. Of course the hungry insect led up the honeyed road of danger presses on regardless of peril, over the margin, down into the open mouth of the pitcher, mindful only of the abundant sweets. But he soon comes to a place on the inner surface of the pitcher where he cannot maintain his foothold. The surface for several inches is there covered with a velvety nap of downward-pointing smooth hairs.

An ant, or any other wingless insect, directly he steps upon this treacherous surface falls into the depths, where he finds the narrowing space for several inches beset on all sides with long sharp spines pointing inward and downward. His frantic efforts

THE PITCHER-PLANT.

to escape only serve therefore to push him further and further toward the bottom. But before he reaches that he will find himself plunged into a watery liquid which the leaf secretes, and which acts upon him first as a powerful narcotic or anæsthetic, and when he is once dead, as a dissolvent which will quickly change his tissue into a "liquid fertilizer" wherewith to nourish the hungry plant.

Winged insects in most cases fare but little better, for if they fly directly upward when they lose their foothold, they strike their heads against the overarching hood, and are perhaps beaten back too far to recover themselves before they are engulfed, or take a zigzag course downward to their destruction. At all events, the long tube of this plant is often found a quarter or half full of dead or decaying insects. That our common Pitcher-Plant carries on the same business less perfectly, though with no different purpose, may be seen by examining any well developed leaf with its tube lined with bristling downward-pointing spines, and half filled with a watery liquid and drowned insects.

The flower of this plant is certainly a very singular one. The pistil consists of an enormous style, which resembles a parasol or a toadstool more than anything else, with the stigma in small patches under the tips of its lobes. The petals, notched in like a fiddle, pass out between the re-entrant angles of the expanded style.

The origin as well as the appropriateness of the English popular name of this plant, the "Side-saddle Flower," appears to be undiscoverable. The generic name was given in honor of Dr. Sarrazin, of Quebec, who, many years ago, first sent specimens of this plant, with some account of its habits, to European bot-

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anists. This genus, which contains some six or eight exclusively American species, is closely related to the *Darlingtonia*, a curiously hooded Pitcher-Plant of the Sierra Nevada mountains, and the still more singular *Nepenthes*, from the islands of the Indian Ocean, which have tendril-like prolongations of the leaf, sometimes two feet or more long, becoming at their ends, perfectly developed pitchers.

Altogether, when we get among these plants with such strange forms and such wonderful habits and functions, we can begin to understand something of what our Longfellow meant when he wrote of that great naturalist, his well-beloved friend, Agassiz;

And Nature, the old nurse, took
The child upon her knee,
Saying: "Here is a story-book
Thy Father has written for thee."

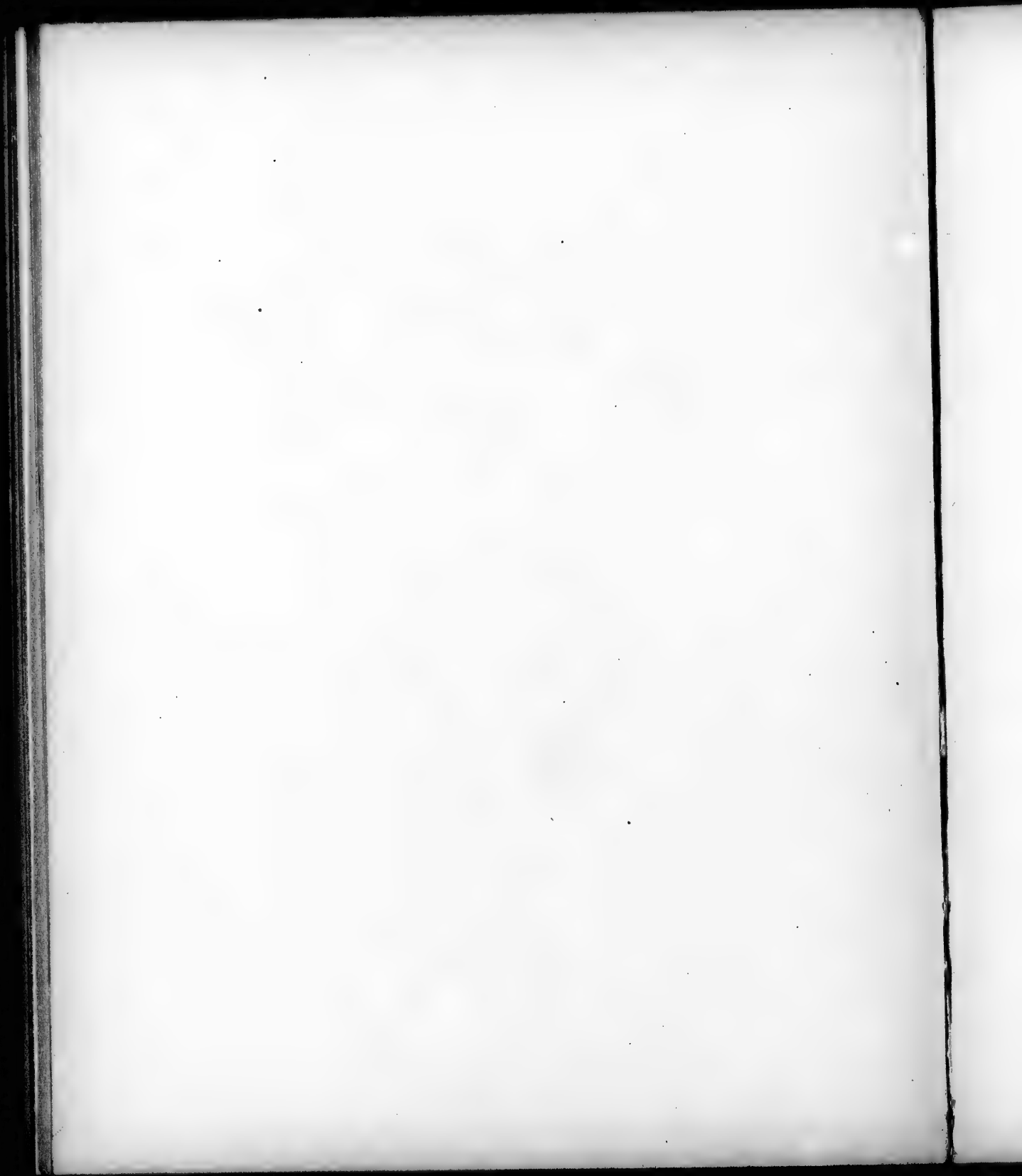
"Come wander with me," she said,
"Into regions yet untrod;
And read what is still unread
In the manuscripts of God."

And he wandered away and away
With Nature, the dear old nurse,
Who sang to him, night and day,
The rhymes of the universe.

And whenever the way seemed long,
Or his heart began to fail,
She would sing a more wonderful song,
Or tell a more marvellous tale.

THE PALE LAUREL.





THE PALE LAUREL.

KALMIA GLAUCA Ait.

Now swells the forest, calm and wide,
In rippling waves of deepest green,
And all the rugged mountain side
Through billowy curves is seen;
The roadsides meet in ample shade,
With showers of light and golden glooms,
And bubbling up the rocky ways
The clustered Laurel blooms.

Each chalice holds the infinite air,
Each rounded cluster grows a sphere;
A twilight pale she grants us there,
A rosier sunrise here;
She broods above the happy earth,
She dwells upon the enchanted days,—
A thousand voices hail her birth
In chants of love and praise!

Elaine Goodale.

THERE are three species of Laurel common in the United States, the most showy being the Mountain Laurel, a conspicuous upland shrub, growing from four to twenty feet high, and crowned in mid-summer with splendid corymbs of rose-colored blossoms. From

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this is easily distinguished the Dwarf Laurel of the lower hills and plains, by its smaller plant and flower, and by the fact that its blossoms are produced below the ends of the branches. Our Pale Laurel grows in peat-bogs and other swampy places, and differs from both the others by flowering in the spring, and by having narrow leaves which are folded back along the edges and covered on the under side with a white bloom or dust, whence the name, Pale Laurel. The flower of the Laurel is unique, the corolla not imperfectly resembling a saucer in shape.

Kalmia is an American genus, though the Heath family, to which it belongs, is famous in the Old World, especially in the British Isles, where the Heather, the favorite of the poets, often forms no inconsiderable element in the beauty of otherwise barren moorlands. Its nearest relatives here are the Azalia, Rhodora, Blueberry, Cranberry, Huckleberry, etc., and some other like shrubs; though it by no means bears so good a reputation as these last-named useful plants. It has the name of being decidedly poisonous, and the Dwarf Laurel has a popular title, the Lambkill or Sheep-Laurel, which indicates this. How well it deserves its bad fame I know not.

From time out of mind the poets have spoken of the Laurel as the particular plant whose leaves make the victor's wreath.

"The Laurel, meed of mighty conquerors,
And poets sage."

But the Laurel of our hillsides and plains was never used to crown poets or conquerors in ancient Greece and Rome. The plant whose leaves were plaited into coronal wreaths, is the Sweet Bay, or Noble Laurel, a tree-like shrub of Southern Europe.

The name is from the Celtic *laur*, green, and refers to its

THE PALE LAUREL.

evergreen foliage. The American Laurel gets its generic name *Kalmia* from Linnæus in honor of a friend and pupil, a Swedish botanist by the name of Peter Kalm, who travelled extensively in this country, in the middle of the last century, and sent specimens of the plant to him.

"Kalm," says Prof. Meehan, "was no common man. He was born in Finland in 1715, and was destined for the church; but after attending a course of lectures by Linnæus, he determined to devote his whole life to the study of natural history. He was subsequently elected Professor of Economy in the University of Abo, which, until its destruction by fire, and removal to Helsingfors in 1827, was one of the leading centres of learning in the north of Europe. The Royal Swedish Academy desired to send some one to explore the northern parts of the American continent, believing from the similarity of the climate that much good would result to Swedish Agriculture, and the kindred arts and sciences; and on the recommendation of Linnæus, Prof. Kalm was selected and a practical gardener detailed to accompany him. He reached Philadelphia in September, 1748. He went in 1749 through New Jersey, and along the Hudson to Albany, thence across Lakes George and Champlain to Canada. Returning again to winter in Philadelphia, the next year he explored western Pennsylvania, the Blue Mountains, and the coast of New Jersey; and went again through New York to Niagara Falls, returning to Philadelphia in October." All this was no small undertaking in a country then almost entirely an unbroken and trackless wilderness; and Kalm had many perilous adventures.

Though the genus is dedicated to Kalm it was known before his day, for we are assured by Prof. Meehan, Banister, an early

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Virginia botanist, had made Ray, the celebrated English naturalist, acquainted with it. The plant was sent in a living state by Bartram to Collinson in England, in 1730. So I suppose by right this beautiful genus of American plants should have commemorated the name of one or the other of these early and enthusiastic American botanists rather than that of the foreign explorer from the far away shores of the Baltic. But no doubt the modest Quaker naturalist was quite satisfied that his friend and correspondent from over the seas should be associated with one of our most interesting flowers.

If one examines a newly-opened flower he will find that around the edge of the bottom of the saucer-shaped part of the corolla there are ten little pockets, and that into each one of these is thrust an anther, the filament arching over from it and running down into the tube of the corolla, by the side of the pistil, which runs up rather high and stiff in the centre. Now it is found that the filaments of the stamens are elastic, and that if by a little quick blow upon the corolla, or by pushing the edge of it out, the anther in the pocket is liberated, it will fly up with a quick motion. It is also found that the pollen is held in two little sacs which open by small holes at the top, and therefore that the whole stamen is not unlike a piece of whale-bone with two quills tied to the end, filled with fine shot. If the whale-bone is bent and then the end suddenly released, it will spring forward and the shot will be projected some distance. So Dr. Gray says, the stamen is a contrivance for discharging pollen at some object. "If the stigma around which the stamens are marshalled, be that object, the target is a small one; yet some one or more of the ten shot might hit the mark. But the discharges can hardly ever take place at all with-

THE PALE LAUREL.

out the aid of an insect. Bees are the insects thus far observed to frequent these flowers; and it is interesting to watch the operations of a humble-bee upon them. The bee, remaining on the wing, circles for a moment over each flower, thrusting its proboscis all round the ovary at the bottom; in doing this it jostles and lets off the springs, and receives upon the under side of its body and its legs successive charges of pollen. Flying to another blossom, it brings its yellow-dusted body against the stigma, and commonly revolving on it as on a pivot, while it sucks the nectar in the bottom of the flower-cups, liberates the ten bowed stamens, and receives fresh charges of pollen from that flower when fertilizing it with the pollen of the preceding one. This account is founded on the observations of Prof. Beal of Michigan, who also states that when a cluster of blossoms is covered with fine gauze, no stamen gets liberated of itself, while fit for action, and no seed sets." So the Laurel feeds the bee, and the bee in turn pollenizes the Laurel and makes it fruitful. The plentiful flowers of the Pale Laurel will help to make and adorn such a scene in nature as this which the poet paints, every word a pigment.

The sun of May was bright in middle heaven,
And steeped the sprouting forests, the green hills,
And emerald wheat-fields, in his yellow light.
Upon the apple-tree, where rosy buds
Stood clustered, ready to burst forth in bloom,
The robin warbled forth his full clear note
For hours, and wearied not. Within the woods,
Whose young and half transparent leaves scarce cast
A shade, gay circles of anemones
Danced on their stalks; the shad-bush, white with flowers,
Brightened the glens; the new-leaved butternut

FLOWERS OF THE FIELD AND FOREST.

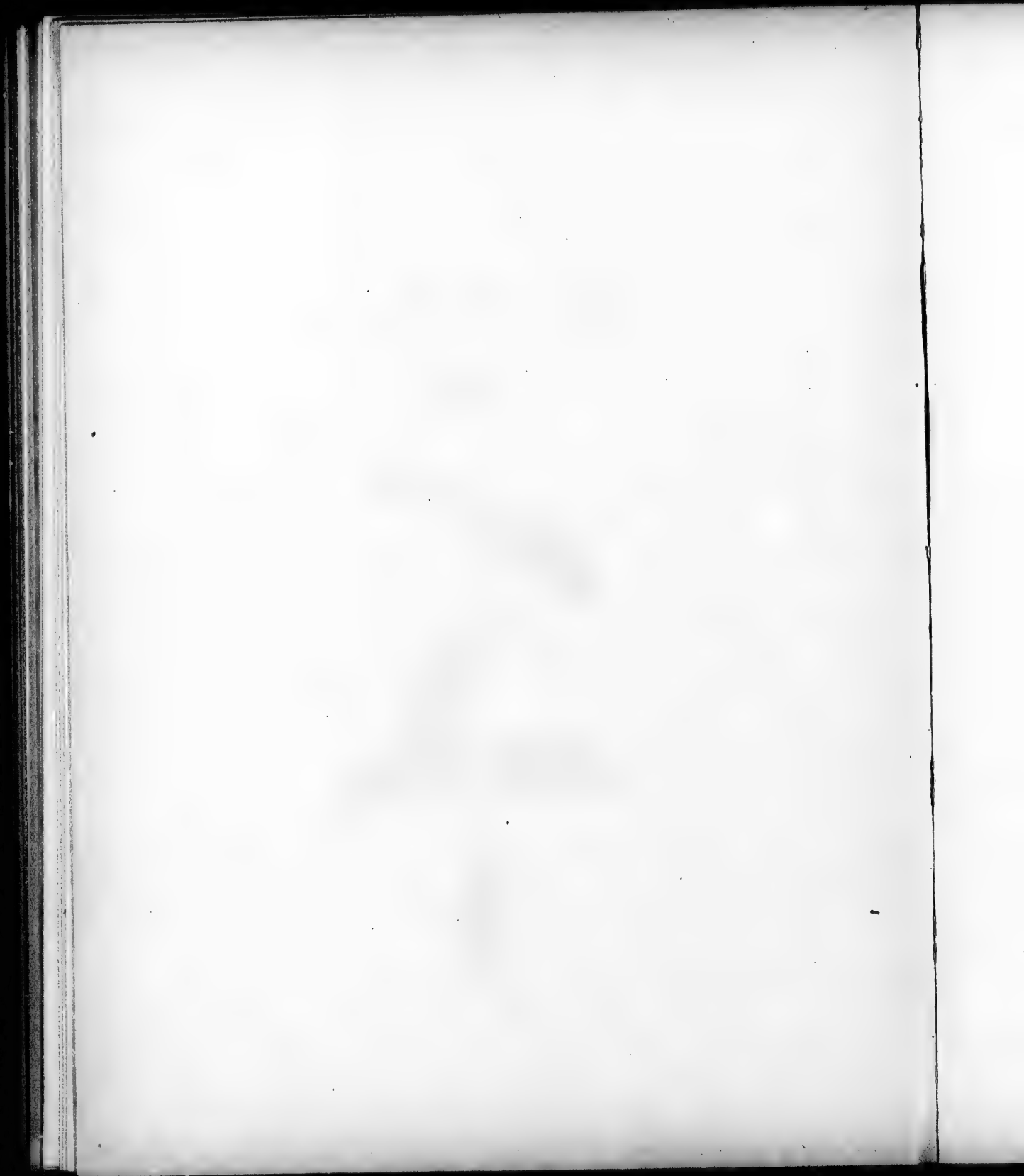
And quivering poplar to the roving breeze
Gave a balsamic fragrance. In the fields
I saw the pulses of the gentle wind
On the young grass. My heart was touched with joy
At so much beauty, flushing every hour
Into a fuller beauty.

Bryant.

THE MEADOW BEAUTY.







THE MEADOW BEAUTY.

RHEXIA VIRGINICA L.

A THING of beauty is a joy forever :
Its loveliness increases; it will never
Pass into nothingness; but will keep
A bower quiet for us, and a sleep
Full of sweet dreams, and health, and quiet breathing.
Therefore, on every morrow are we wreathing
A flowery band to bind us to the earth,
Spite of despondence, of the inhuman dearth
Of noble natures, of the gloomy days,
Of all the unhealthy and o'er-darkened ways
Made for our searching: yes, in spite of all,
Some shape of beauty moves above the pall
From our dark spirits. Such the sun, the moon,
Trees old and young, sprouting a shady boon
For simple sheep; and such are daffodils
With the green world they live in; the clear rills
That for themselves a cooling covert make
'Gainst the hot season; the mid-forest brake,
Rich with a sprinkling of fair musk-rose blooms:
And such, too, is the grandeur of the dooms
We have imagined for the mighty dead;
All lovely tales that we have heard or read:
An endless fountain of immortal drink,
Pouring into us from the heavens' brink.

Keats.

FLOWERS OF THE FIELD AND FOREST.

NOBODY seems to know why so beautiful a flower has so barbarous a name. Though some, curious in these things, have traced the name all the way back to Pliny, who knew a plant of that name, they are still driven to the conclusion so sententiously expressed by Dr. Gray, that "*Rhexia* has been applied to this genus without obvious reason." It is thought to have some value as a "vulnerary," or, in other words, to be useful in the cure of wounds. Whatever may be said about its scientific, nobody will call in question the peculiar fitness of its popular name. It surely is "a thing of beauty," and so, by the poet's logic, "a joy forever."

It affects swamps and damp meadows as its favorite haunts, and has a pretty wide distribution throughout the eastern United States. A singular fact about it is that it is the only representative in our northern regions of an enormously large order of plants native in tropical America. The order contains a thousand species or more; and out of them all, only this solitary one has had the courage to emigrate north or undertake to live beyond the thirtieth parallel.

A striking peculiarity of the order is the strongly ribbed leaves, the ribs varying from three, in the *Rhexia*, to as many as nine in other genera. Another noticeable peculiarity of this order is the long curved anther which is attached to the filament at the middle. It usually has also an additional process like a spur appearing near the point of attachment, as may be seen in this species. Prof. Goodale says, "the pollen consists of extremely minute grains which escape through a pore at the apex of the tapering anther." I have recently seen the statement made by some observer, that the larger end of the anther is a

THE MEADOW BEAUTY.

kind of inflated air sac, with thin walls, which when pressed upon or struck, as when an insect lights upon it or touches it with his rapidly moving wings, it acts like a bellows and blows little puffs or jets of pollen dust out of the small pore at the end. Thus the stigma of the flower or the insect himself gets abundantly besprinkled with the fertilizing powder, which we can easily see he might convey to other *Rhexia* blooms.

We can scarcely look upon so beautiful a wild-flower as this without asking ourselves how came these colors and these strange forms of beauty? Are they for themselves alone? Or are they to please the æsthetic taste of the beholder, for

"Since eyes were made for seeing
Beauty is its own excuse for being."

Still, it must be remembered if we think we will make that answer, that,—

"Full many a flower is born to blush unseen
And waste its sweetness on the desert air."

And, ages and ages after the flowers began to bloom, there was upon the earth no beauty-drinking eye to quaff ethereal sweetness from their tinted petals. Did they serve no good end in all those vast periods?

The naturalist, who thinks he must find a reason for everything he sees in nature, has undertaken to show how plants came to have flowers at all; that is, of course, petals, or colored sepals, the showy parts of the flower, for all kinds of plants except the very lowest have the essential parts of a flower, the staminate and pistilate elements and mechanism. To state the naturalist's conclusion broadly I should say, the floral envelope has been evolved,

FLOWERS OF THE FIELD AND FOREST.

by means of insects, and for the purpose of further securing their help in the act of pollenization. That insects have something important to do with the showy dress of the flower may be inferred on general grounds from the fact that such plants as depend upon the wind to carry their pollen from anther to stigma, like the pines and other cone-bearing trees, the grasses, and notably our Indian corn, have no colored flower at all; while the plants that manifestly seek, or at all events are benefited by, the help of insects in pollenization are furnished by nature with floral appendages more or less showy and attractive.

I do not want to be understood to say that the insect comes to the flower because he admires the brilliant colors of its petals, but because he finds a toothsome drop of nectar in its cup or in its tender surface-cells. The color of the flower is but a sign to advertise him where a good dinner may be had for the taking. It may be assumed that even in apetalous flowers he has already got a taste of nature's sweets. Then any change, however slight, of stamens into petaloid shapes, with ever so little addition of color, would be an advantage in the struggle for existence, to any flower possessing it, an advantage likely to be transmitted and to be improved upon as the generations went by.

At first, the flowers would be yellow, the petals being only slightly modified stamens, which are usually of that color. A still further development would produce white, red or pink, and last of all, purple, blue, and violet flowers. We infer that this was the order of the evolution of color in flowers, for two reasons: The first is, because we find a correlation between the flowers of certain colors, and insects of certain degrees of development in respect to their honey-gathering function. Mr. Grant Allen, an English

THE MEADOW BEAUTY.

writer, says, "Thus, to take a few examples out of hundreds that might be cited, the flowers which lay themselves out for fertilization by miscellaneous small flies, are almost always white; those which depend upon the beetles are generally yellow; while those which bid for the favor of bees and butterflies are usually red, purple, lilac or blue. Down to the minutest distinctions between species, this correlation of flowers to the tastes of their particular guests seems to hold good. Herman Müller notes that the common galium of our heaths and hedges is white, and is visited by small flies, while its near relative, the lady's bedstraw, is yellow, and owes its fertilization to little beetles. Fritz Müller noticed a lantana in South America, which changes color as its flowering advances; and he observed that each kind of butterfly which visited it, stuck rigidly to its own favorite color, waiting to pay its addresses until that color appeared."

We thus see how the special tastes of insects may have become the selective agency for developing white, pink, red, purple and blue petals, from the original yellow ones. But, before they could exercise such a selective action, the petals must themselves have shown some tendency to vary in certain fixed directions. An investigator, who has given much study to the coloring matter of plants and its chemical nature and action, gives us a point here, which will, perhaps, solve this part of our problem. He assures us that the pigments for all of these colors are laid up in all plants, and only need to be slightly modified in chemical constitution, in order to make them into the blues, pinks, and purples, with which we are familiar.

Another reason for supposing that the evolution of color in flowers has been along the line indicated above, is, that we see

FLOWERS OF THE FIELD AND FOREST.

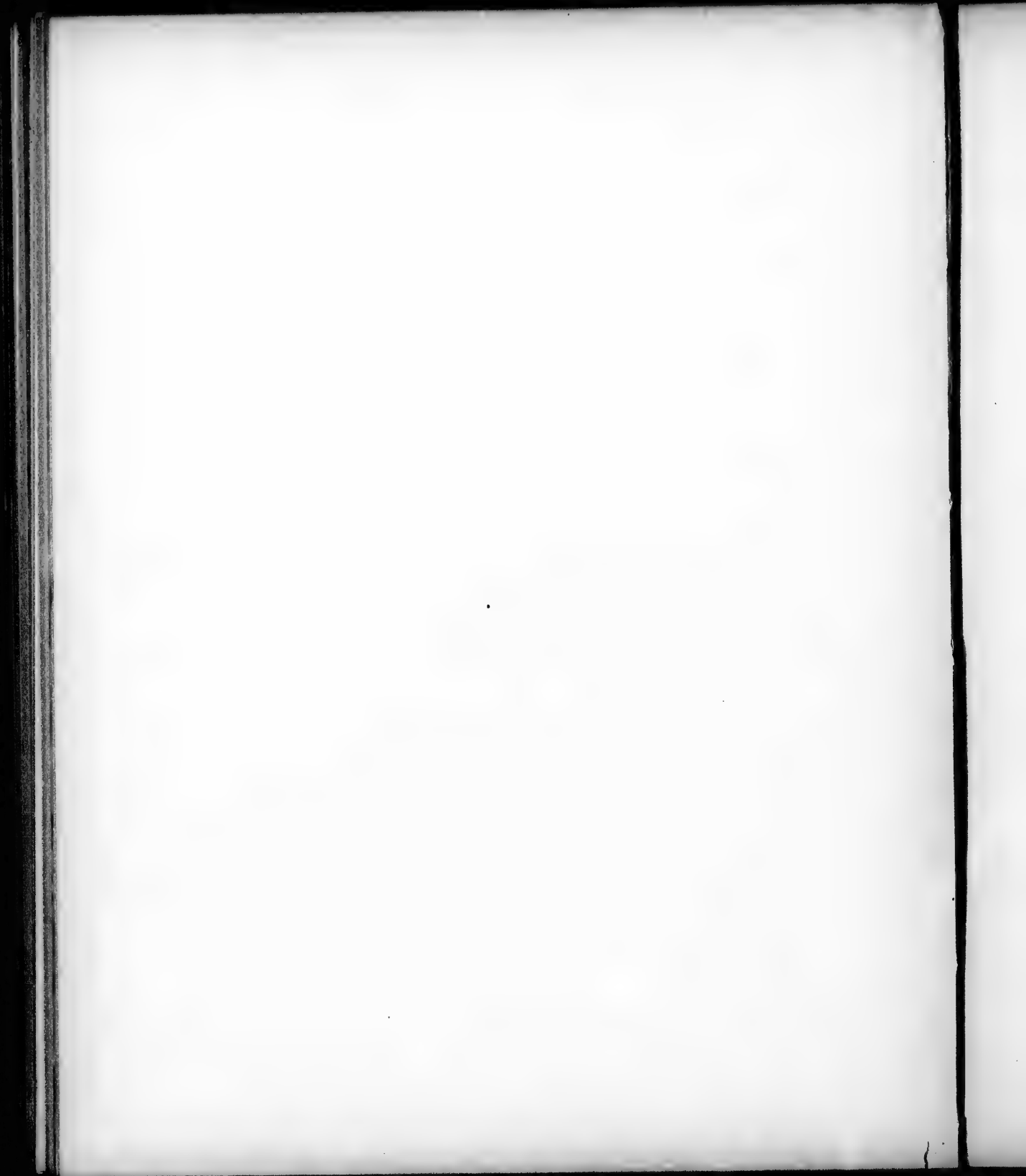
many flowers follow that track in their individual development. A common English forget-me-not is pale yellow when it first opens, then changes to pink, and ends by being blue. A wall-flower is first whitish, then yellow, and finally red or blue. An evening primrose has white flowers at first, but at a later period of development, red ones. *Cobæa scandens*, which has been flowering luxuriantly and blossoming perfectly in my study all winter, has constantly shown this kind of evolution of color. It is first green, then lightens much into a very pale-green, or white, and then begins to develop toward purple, passing in some cases as I noticed, through a pronounced pink. Its final color is a strong purple. The garden convolvulus opens, a blushing white, and passes into a full purple. When changes in the color of flowers take place during the process of growth, they are, so far as has been observed, all in this, and never in the opposite direction.

There can scarcely be good reason to question, I suppose, that the evolution of flowers and of honey-eating insects has gone on side by side, each helping the other. In given cases, the color and form of the floral envelope, the nature of the honey sack, together with the position of the stamens and pistil, are all correlated with the specialized organs and particular habits of the insect tribe whose help is depended upon in the act of pollenization. Owing something, then, to the agency of insects for the possession of all the exquisite beauty and sweetness of flowers, I can make no more appropriate ending for this paper, than by quoting a few lines from Emerson's "Humble-bee."

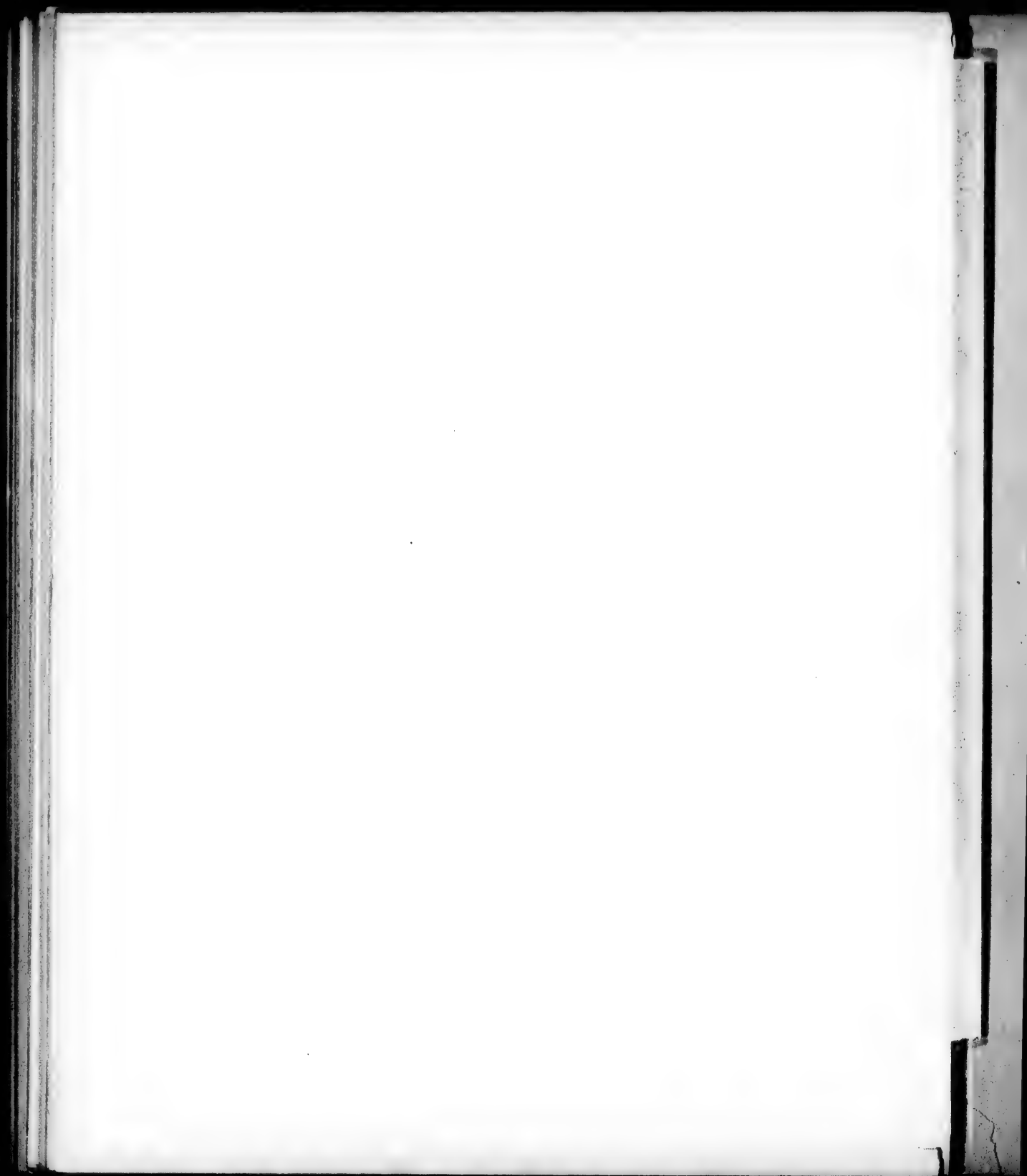
Hot mid-summer's petted crone,
Sweet to me thy drowsy tone,

THE MEADOW BEAUTY.

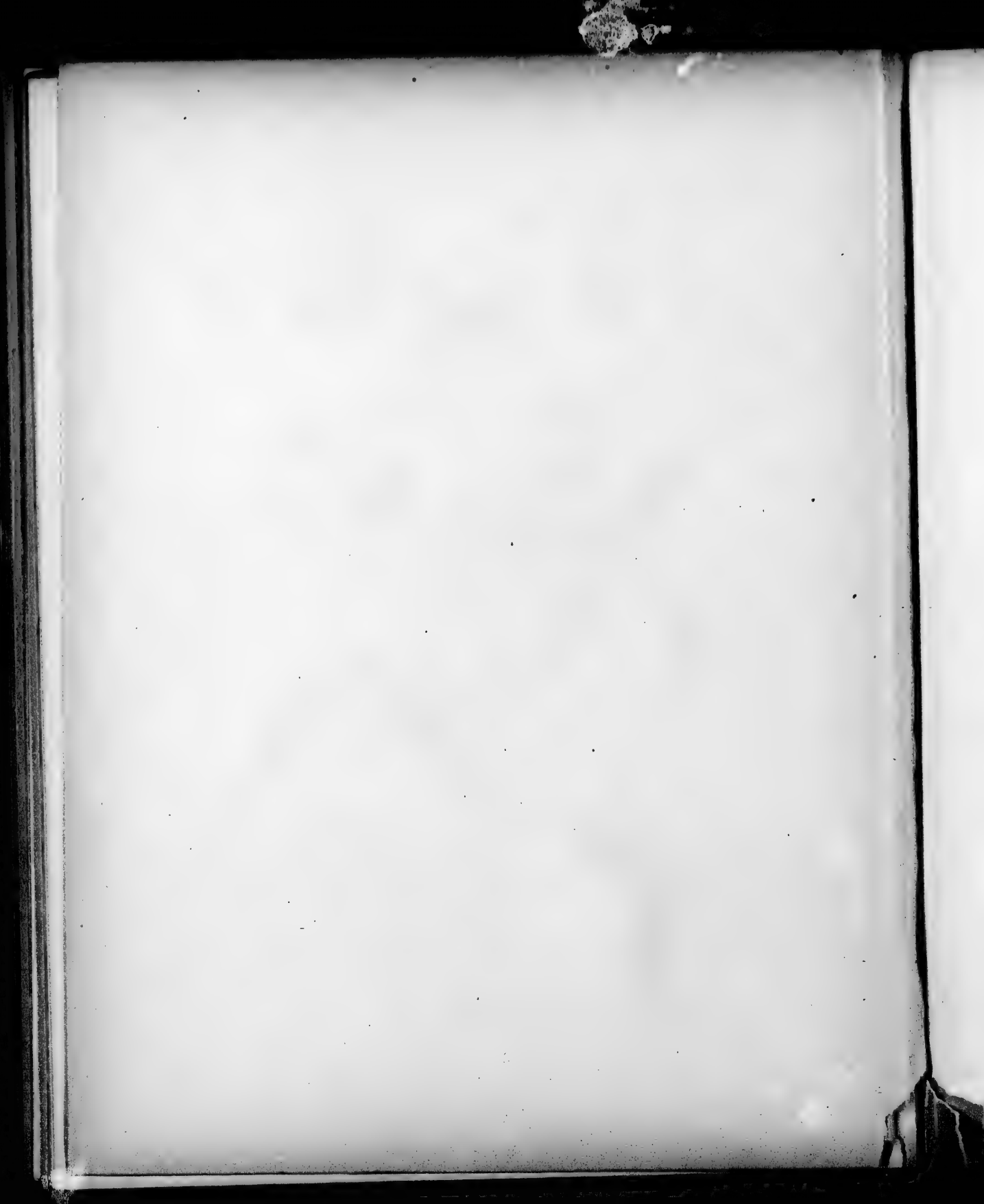
Tells of countless sunny hours,
Long days, and solid banks of flowers.
Aught unsavory or unclean
Hath my insect never seen;
But violets and bilberry bells,
Maple-sap and daffodels,
Grass with green flag half-mast high,
Succory to match the sky,
Columbine with horn of honey,
Scented fern and agrimony,
Clover, catch-fly, adder's-tongue,
And brier roses dwelt among;
All beside was unknown waste,
All was picture as he passed.
Wiser far than human seer,
Yellow-breeched philosopher:
Seeing only what is fair,
Sipping only what is sweet.
Thou dost mock at fate and care
Leave the chaff and take the wheat.



THE BUR-MARIGOLD.







THE BUR-MARIGOLD.

BIDENS CHRYSANTHEMOIDES Michaux.

THE quiet August noon has come;
A slumbrous silence fills the sky,
The fields are still, the woods are dumb,
In glassy sleep the waters lie.

And mark yon soft white clouds that rest
Above our vale, a moveless throng;
The cattle on the mountain's breast
Enjoy the grateful shadow long.

Oh, how unlike the merry hours,
In early June, when earth laughs out,
When the fresh winds make love to flowers
And woodlands sing, and waters shout.

But now a joy too deep for sound,
A peace no other season knows,
Hushes the heavens and wraps the ground,
The blessing of supreme repose.

Beneath the open sky abroad,
Among the plants and breathing things,
The sinless, peaceful works of God,
I'll share the calm the season brings.

Bryant.

FLOWERS OF THE FIELD AND FOREST.

It is in the midst of a scene like this, in the full-orbed summer, in the peaceful quiet of a season which has got through the hurry and bustle of life, has finished mainly the intense business of growth, the making of flowers and foliage, and just now pauses, a little drowsy with the heat, that the Bur-Marigold may be seen dotting the lowland meadows and swamps with its brilliant flowers. It is a plant of much beauty and interest, and will well repay a close acquaintance. It is a stout herb, from one to three feet high, with smooth, lanceolate, toothed, opposite leaves, bearing a few large, showy flowers, as seen in the plate.

It belongs to a genus which has some fifty or more species scattered over the tropical and temperate zones, some even being found in the arctic regions. It is a member of that largest order of flowering plants known as the Compositæ, plants which have a large number of flowers crowded together in a common receptacle or head, like the Dahlia, Dandelion, Marigold, etc. In the other plants each fertile flower produces a seed-vessel containing from a few to a very great number of seeds. In this order there is but one seed to each flower, and no proper seed-vessel at all.

In the Compositæ the individual flowers are necessarily very small, being packed together so closely in the head. But they usually contain all the parts of the true flower. The corolla is contracted into a narrow tube toothed at the top, the stamens adhering together by their anthers from another tube inside of this. The pistil, forked at top, pushes up through the inner tube of anthers, and, having its stigmatic surface covered with teeth-like processes, combs off much of the pollen and so is sure to be fertilized.

The calyx does not usually develop till after the rest of the

THE 'BUR-MARIGOLD.

flower has withered and fallen away, when it takes its chance for development, and grows into bristles, hairs, scales, awns, teeth, etc., upon the top of the seed. The thistle-down is a good example of this; likewise, the two barbed teeth which crown the top of the flat seeds in our present plant. The curious and interesting arrangement of these seeds in the head, I may have occasion to speak of in another place.

The great family of the Composite flowers, which numbers about 12,000 species, or one-tenth of all flowering plants, is divided into three groups, according as each separate flower in the head has a strap-shaped floral appendage, as in the dandelion, or these floral parts occur only around the margin of the head, like rays, as in the Marigold and Sunflower, or are absent altogether, as in the Thistle. These groups are still farther divided and subdivided on other points of difference. The plants of this great order are mostly characterized by an acrid or stringent juice, which makes many of them serviceable in medicine, while some are very poisonous.

The scientific name of the genus *Bidens*, means two teeth, and is given in recognition of the two awns before referred to, with which the seeds are provided. These barbed teeth serve an excellent purpose, as minute grappling-hooks to attach the seeds to the fleece or hair of animals, the plumage of birds, and the clothing of men, thereby widely distributing them from the neighborhood of the mother plant.

In the usage of sentiment Mr. Hulme says, "The Pansy and Marigold are associated together as emblems of sorrow, and cards having wreaths of these two flowers painted on them and such mottoes as, 'May you ever escape them,' 'May they be far removed from thee,' are presented to each other by friends as an

FLOWERS OF THE FIELD AND FOREST.

offering and expression of kindly feeling. The French word for the Marigold and for care and anxiety is the same, *souci*, and the flower is dedicated to the Virgin Mary, *Mater dolorosa*. It would, however, appear to have been originally but an undesigned corruption, or else play upon words, its old name being *soucicle*, a word derived from the Latin *solis cyclus*, the circle of the sun, either on account of the brilliant yellow disk and rays of the flower, not unlike the heraldic representation of the sun, or the habit of the flowers turning with the sun toward the light — two theories for the origin of a name that would equally well suit the Sunflower of our gardens, a flower that Gerarde, writing in 1596, calls the 'Flower of the Sunne, or Marigold of Peru.' The English name, when analyzed, means literally the 'golden flower of Mary,' and points to a time when the monks held sway both in religious thought and botanical nomenclature, and not unfrequently tried to combine the two."

The garden Marigold is reckoned a good barometer, having the habit of closing up its petals at the approach of rain. Whether our present plant does this I cannot say. But many flowers certainly do, or at least they shut up upon the obscuration of the sun. Whether they think the clouding in of that luminary is premonitory of rain I know not. But I have seen a field brilliant with the blossoms of the Dandelion, almost literally a "cloth of gold" shining in the morning sun, and in an hour not a single trace of a flower could be seen anywhere. The sun had gone into retirement behind thick clouds, and the Dandelions had every one folded up their yellow rays and wrapped their green mantle around them, and gone to sleep, indistinguishable in the universal green of the meadows.

THE BUR-MARIGOLD.

Into the story of this sun-loving and sun-worshipping flower I must be permitted to frame Emerson's picture of the poet naturalist, Thoreau:

And such I knew, a forest seer,
A minstrel of the natural year,
Foreteller of the vernal ides,
A lover true who knew by heart
Each joy the mountain dales impart;
It seemed that Nature could not raise
A plant in any secret place,
In quaking bog, on snowy hill,
Beneath the grass that shades the rill,
Under the snow, between the rocks,
In damp fields known to bird and fox,
But he would come in the very hour
It opened in its virgin bower,
As if a sunbeam showed the place,
And tell its long-descended race.
It seemed as if the breezes brought him;
It seemed as if the sparrows taught him;
As if by secret sight he knew
Where in far fields the orchis grew.
Many haps fall in the field
Seldom seen by wishful eyes,
But all her shows did Nature yield,
To please and win this pilgrim wise.

He trod the unplanted forest floor, whereon
The alluring sun for ages hath not shone;
He saw beneath dim aisles, in odorous beds,
The slight *Linnæa* hang its twin-born heads,
And blessed the monument of the man of flowers,
Which breathes his sweet fame through the northern bowers.

FLOWERS OF THE FIELD AND FOREST.

He found the tawny thrush's broods:
And the shy hawk did wait for him;
What others did at distance hear,
And guessed within the thicket's gloom,
Was showed to this philosopher,
And at his bidding seemed to come.

THE CLIMBING HEMP-WEED.





CLIMBING HEMP-WEED.

MIKANIA SCANDENS Willd.

I COME from haunts of coot and hern,
I make a sudden sally,
And sparkle out among the fern,
To bicker down a valley.

I chatter over stony ways,
In little sharps and trebles,
I bubble into eddying bays,
And babble on the pebbles.

I chatter, chatter, as I flow
To join the brimming river,
For men may come and men may go
But I go on forever.

I wind about, and in and out,
With here a blossom sailing,
And here and there a lusty trout,
And here and there a grayling;

And draw them all along, and flow
To join the brimming river,
For men may come and men may go,
But I go on forever.

Tennyson.

FLOWERS OF THE FIELD AND FOREST.

IN the sound of babbling brooks and singing birds, our graceful climber lives out the shining months of its summer life. It makes its home upon the shady banks and interlacing with the limbs of overarching trees, it curtains the bed of the sleepless streamlet with its festoons of leaves and clustering flowers. In such situations it may be looked for anywhere in the United States east of the Mississippi. The genus, which was named for Professor Joseph Mikan, of Prague, includes some sixty species found mostly in the warmer parts of America, Asia, and Africa.

It belongs to the order Compositæ, described in the last paper, though the heads of white and pink blossoms are unusually small, containing but four flowerets each. Several of these small heads are gathered into the flower-clusters represented in the plate. The fact that this vine belongs to the same order with the Thistle and Dandelion indicates the remarkable variety in the form and habit of plants so closely related in their flowering as are the members of this order. For we find in it not only such plants as the Marigold and Aster, and this vine, but many woody shrubs and several forest trees.

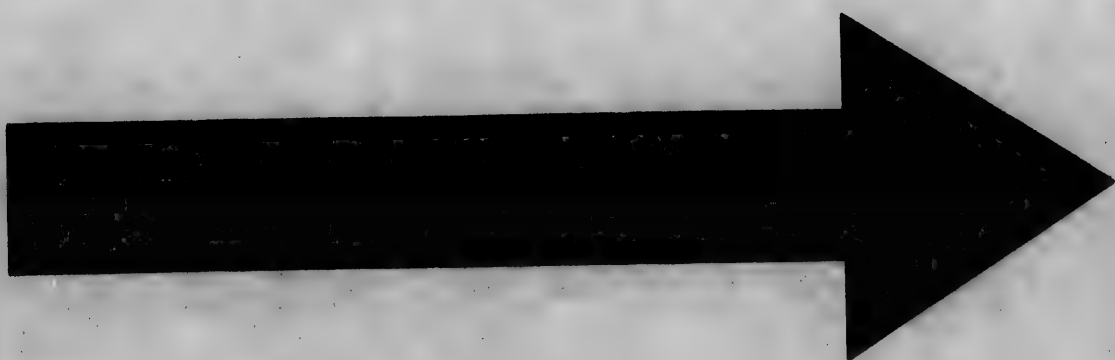
The blossoms of the Hemp-Weed open in midsummer and form a fine contrast with the bright-green, strongly-veined leaves. I doubt not the foliage with its graceful outline and rich color will form as attractive a part of the picture both in the book and in nature, as the flowers themselves. Indeed, I think we only need to have our attention called to the matter, to find more and more that is peculiarly attractive and charming in the foliage of plants. I can conceive of nothing in the plant world more admirable than some Horse-Chestnut trees which I have seen, the memory of which as a picture of great pleasantness will always

THE CLIMBING HEMP-WEED.

remain with me. To be sure, they had the grace of a well-rounded form, bounded by lines of beauty on every side. But their foliage was their glory, a solid mass of it, every leaf and leaflet perfect, and perfectly arranged and displayed, the terminal ones overlying each other from the bottom to the top of the tree like the feathers upon the breast of a bird. They were indeed master-pieces of Nature's art; pictures of the most exquisite beauty painted in one pigment. How simple are nature's methods, but how manifold the results.

In a former paper in this book I have recommended making collections of leaves of plants for studies of artistic forms. Since writing that paper I have chanced upon the same suggestion by Starr King in his "White Hills." I am only too glad to be convinced by eloquence so fine that my hint had not even the merit of novelty. The idea is all the more valuable to me, now that I find it commended by a lover of nature, whose fine sense of her various and matchless beauties is only equalled by the incomparable skill with which he makes them live and shine in his glowing words. He says:

"While we are shut in by the forest, we may turn our attention to the symmetry and variety of the leaves, and try to learn something of Nature's wealth of resources as to graceful form, within narrow boundaries. An eye that is sensitive to the grace of curves and parabolas and oval swells will marvel at the feast which a day's walk in the woods will supply from the trees, the grasses, and the weeds, in the varying outlines, the notchings, veinings, and edgings of the leaves. They stand for the art of sculpture in Botany, representing the intellectual delight of Nature in form, as the flowers express the companion art of painting.



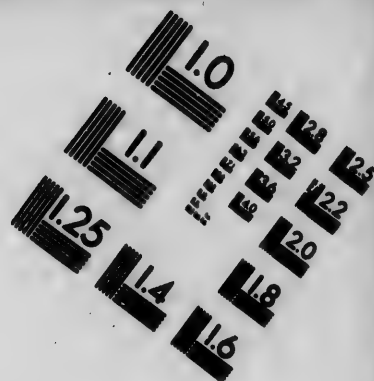
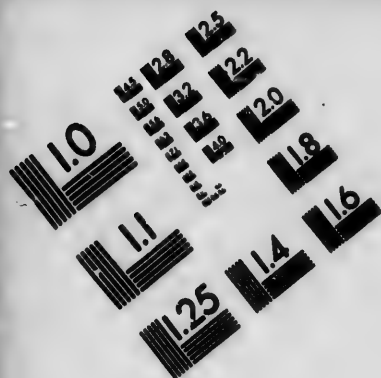
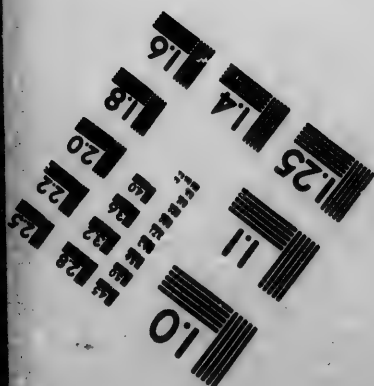
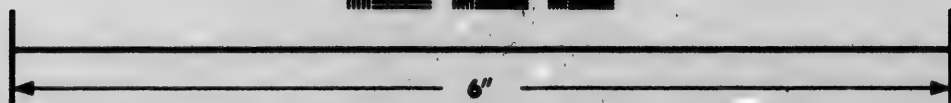
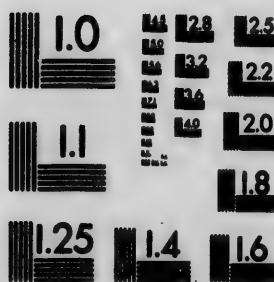


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FLOWERS OF THE FIELD AND FOREST.

Leaves are the Greek, flowers the Italian phase of the spirit of beauty that reveals itself through the Flora of the globe.

"An exhaustive collection of leaves would form one of the most attractive museums that could be gathered. It would be a privilege that could not but unseal in some measure the dullest eye, to look in one day over the whole scale of Nature's foliage-art, from the feathery spray of the moss, to the tough texture of the Amazon lily's stem that will float a burden of a hundred weight; from the bristles of the pine-tree to the Ceylon palm-leaf that will shelter a family with its shade.

"Would it not astonish us with something like reverent admiration, if we could sweep the gradation of Nature's green as it is distilled from arctic and temperate and tropic light, and varied by some shade on every leaf that grows; if we could scan all the textures of the drapery woven out of salts and water in botanic looms, from the softest silk of the corn to the broad tissues of the banana's stock; if we could see displayed in wide masses all the hues in which Autumn dyes the leaves of our own forests, as though every square mile had been drenched in the aerial juices of a gorgeous sunset? And then when we should see how the general geometry of the verdure is broken into countless patterns, we should find our museum of leaves as engaging a school for the education of the intellect as a collection of all vertebræ, or a representative conservatory of the globe.

"A careful and eloquent observer of Nature describes the leaf as the sudden expansion of the stem that bore it; an uncontrollable expression of delight, on the part of the twig that Spring has come, shown in a fountain-like exaltation of its tender green heart into the air. And to hold this joy, Nature moulds the leaves as

THE CLIMBING HEMP-WEED.

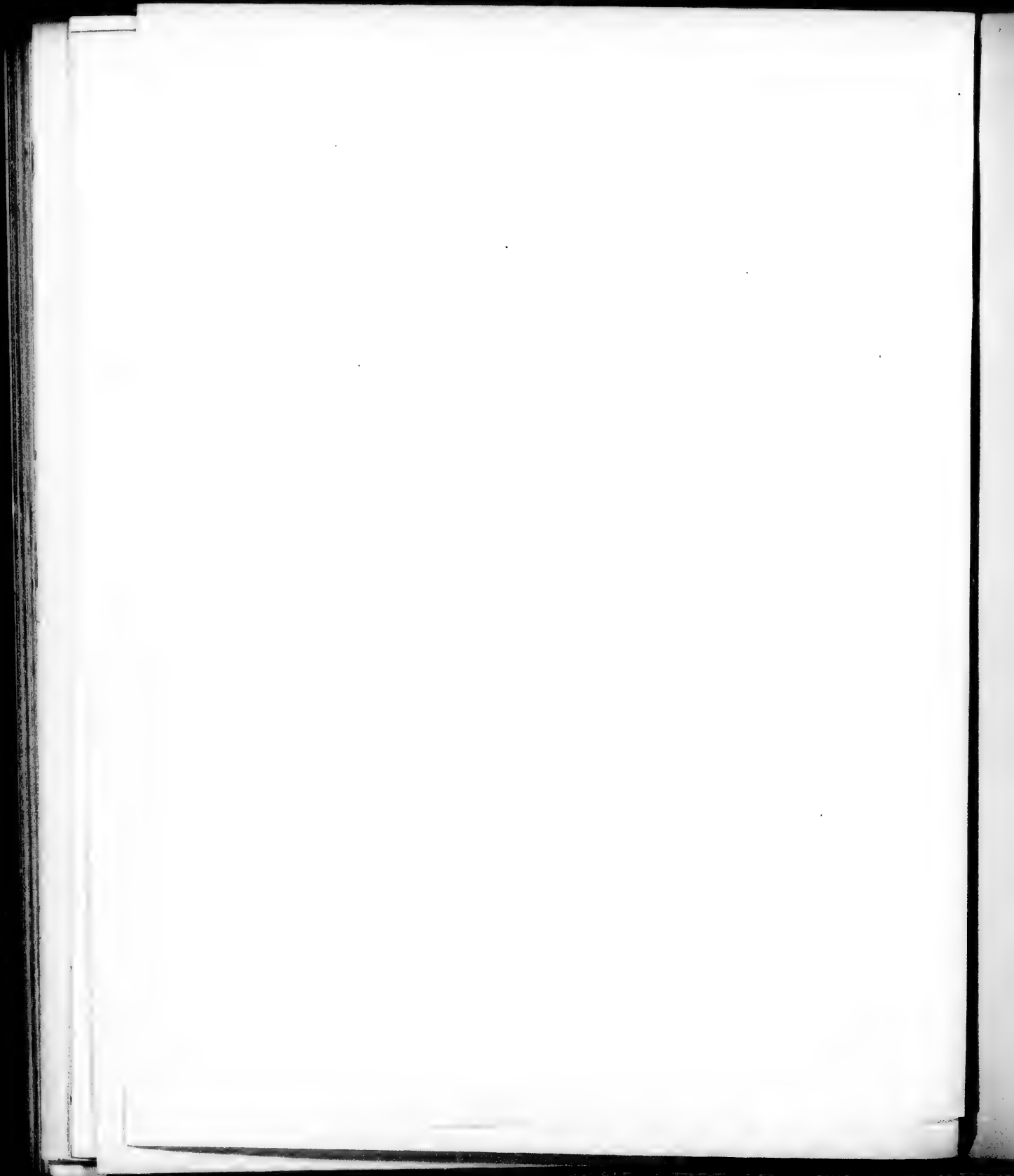
vases into the most diverse and fantastic shapes,—of eggs, and hearts, and circles, of lances, and wedges, and arrows, and shields. She cleaves and parts and notches them in the most cunning ways, combines their blades into the most subtle and complicated varieties, and scallops their edges and points into patterns that involve, seemingly, every possible angle and every line of grace."

The grace of this airy vine and the delicious summer rest and the peaceful calm of the blue air which it calls to mind, brings with it the memory of Lowell's lines :

This willow is as old to me as life;
And under it full often have I stretched,
Feeling the warm earth like a thing alive,
And gathering virtue in at every pore,
Till it possessed me wholly and thought ceased,
Or was transfused in something to which thought
Is coarse and dull of sense. Myself was lost,
Gone from me like an ache, and what remained
Became a part of the universal joy.
My soul went forth, and, mingling with the tree,
Danced in the leaves; or floating in the cloud,
Saw its white double in the stream below;
Or else sublimed to purer ecstasy,
Dilated in the broad blue over all.
I was the wind that dappled the lush grass,
The thin-winged swallow skating on the air;
The life that gladdened everything was mine.
Was I thus truly all that I beheld?
Or is this stream of being but a glass
Where the mind sees its visionary self,
As, when the kingfisher flits o'er his bay,
Across the river's hollow heaven below
His picture flits;—another, yet the same?



THE WHITE BAY.







THE WHITE BAY.

GORDONIA PUBESCENS.

OH, ye who love to overhang the springs,
And stand by living waters, ye whose boughs
Make beautiful the rocks o'er which they play,
Who pile with foliage the great hills, and rear
A paradise upon the lonely plain,
Trees of the forest and the open field!
Have ye no sense of being? Does the air,
The pure air, which I breathe with gladness, pass
In gushes o'er your delicate lungs, your leaves,
All unenjoyed? When on your winter's sleep
The sun shines warm, have ye no dream of spring?
And when the glorious spring-time comes at last,
Have ye no joy of all your bursting buds,
And fragrant blooms, and melody of birds,
To which your young leaves shiver? Do ye strive
And wrestle with the winds, yet know it not?
Feel ye no glory in your strength when he,
The exhausted Blusterer, flies beyond the hills
And leaves you stronger yet?

Nay, doubt we not that under the rough rind,
In the green veins of these fair growths of earth,
There dwells a nature that receives delight
From all the gentle processes of life,
And shrinks from loss of being. Dim and faint
May be the sense of pleasure and of pain,
As in our dreams; but, haply, real still.

Bryant.

FLOWERS OF THE FIELD AND FOREST.

THE only representative of our peculiarly rich Southern flora which adorns our pages is the White Bay, represented so finely in our plate. It is a large shrub, blooming resplendent in the everglades of Florida and the rich semi-tropical forests of Georgia. Mr. Sprague has reproduced the beauty and elegance of the flower so faithfully that I need not attempt a further description of it in words.

The genus was named for Dr. Gordon, an old-time botanist of Aberdeen, Scotland. It belongs to the order of the Camellias, and is first cousin to the tea plant whose fragrant decoction daily "cheers but does not inebriate" the whole civilized world.

If my readers will look with a little care at the leaves on the plant, as the artist has pictured them, they will see that they are not arranged one directly above the other, nor one opposite the other, but, in what appears at first sight, a disorderly fashion about the stem. It will be worth while, I trust, to look a little into what is suggested by this fact, and see if there be a law or system in the arrangement of the leaves of plants. This matter has been the subject of no little study on the part of botanists and other scientific people, and here, as elsewhere in nature it has been found that the rule is not accident or chaos, but law and order.

"All nature is but art unknown to thee,
All chance, direction which thou canst not see,
All discord, harmony not understood."

But we are learning to know nature's art, and to understand the deeper harmonies hidden in her apparent discords.

Dr. Gray says the leaves are symmetrically arranged upon the stem, and that their position determines that of the buds and

THE WHITE BAY.

branches. "A plant no less than an animal is symmetrical. Leaves are either single, or else there is a pair or more than a pair upon each joint. When a pair only, they stand always upon exactly opposite sides of the stem; when three, four, or any other number, they divide the circumference of the stem equally, that is, they stand as far apart from each other as possible in the circle. A circle of three or more leaves is called a whorl. The pairs or whorls of leaves follow each other in a fixed order; each pair stands over the intervals of the pair next below, and the leaves of the whorl of three or other number correspond to the intervals of those next below and above.

"In the alternate arrangement, that is when bud and leaf is produced upon each joint, the single leaves succeed each other in a definite order maintaining a complete symmetry. Each leaf projects from the stem at a fixed angle with that which precedes it, which is uniform for the species, but is different in the different species. In the simplest case the second leaf is on exactly the opposite side of the stem from the first, of course higher up; the third leaf on the opposite side from the second, and therefore vertically over the first. So the leaves are in two vertical ranks; the angular divergence, that is, the angle which successive leaves make is one half the circumference of the stem.

"Other plants have the angular divergence one-third, that is, the second leaf is placed one-third round the stem; the third is one-third round from that, and the fourth of course comes directly over the first, the fifth over the second, and so on, the leaves being hence disposed in three vertical ranks." Alders and sedges form an example of this. "A line traced on the stem through the place of attachment of the successive leaves forms a spiral:

FLOWERS OF THE FIELD AND FOREST.

each turn from one leaf round to the one directly over it is called a cycle. Alternate leaves are never in four ranks, but they are very commonly—most commonly—in five. In that case the angular divergence or portion of the circle between two successive leaves is two-fifths of the circumference, and the spiral line ascends through two whole turns round the stem before it touches a leaf exactly over the one at the point of starting, and that is the sixth leaf in the series. These several modes of arrangement may be designated by the fractions $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, which measure the angle of divergence of the successive leaves in the spiral. The denominators likewise express the number of vertical ranks, and the numerators the number of turns round the stem which the spiral makes in completing the cycle." But leaves are arranged in 8 vertical ranks, and in 13, and 21, and 34, and even a greater number. In such cases the spiral makes respectively 3, 5, 8 and 13 turns in completing the cycle.

It will be found that these fractions form a series, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{7}$, $\frac{1}{8}$, etc., each numerator from the third being formed by adding together the two preceding numerators, and the denominators are formed in the same way. The subject comes therefore within the field of mathematics, and has furnished matter for much interesting mathematical discussion. Among other points deduced from the mathematical treatment of the question is this, that however high the series runs, and it is quite complex in some developments of it, as in the pine cone and the arrangement of seeds in the heads of composite flowers, no successive leaves are ever more than one-half the circumference apart or ever less than one-third.

Prof. Benjamin Peirce pointed out that there was also a

THE WHITE BAY.

correspondence between this law of position of the leaves and other parts of plants on the stem, and the law of the motion of the planets about the sun, so that if the time of the revolution of any planet be divided by the time of the planet next outside it, the quotient would be one of the fractions which express the position of the leaves, nearly, as given above.

If we inquire the reason for such an arrangement of the leaves as here set forth, we are told that we shall find at least one reason in the fact that by placing the leaves in these positions they are thus best arranged to receive light, the force by which they perform their double function of lungs and stomach; that when so placed the leaves above cut off less of the light from those below than by any other arrangement. There is also another reason suggested in the fact that this arrangement gives symmetry and beauty to the plants not otherwise attainable. But I suppose we may look for other reasons and more profound, for building plants and planets on this one plan, in the mind of Him who is the Architect of both.

This law of the position of the leaves of plants was first noticed about a century ago by Bonnet, a French botanist, who wound a thread about a twig of plum or peach, touching the points of attachment of the successive leaves. He observed the resulting spiral, and the fact that the successive leaves made a uniform angle with each other about the stem. Other botanists made the observation with respect to a large number of plants and noted the various applications of the law in the different species and the different parts of the plant, as in the leaf-buds, flower-buds, petals, sepals, seeds, etc. But it was left to our great mathematician Prof. Peirce, in 1849, to announce the mathemati-

FLOWERS OF THE FIELD AND FOREST.

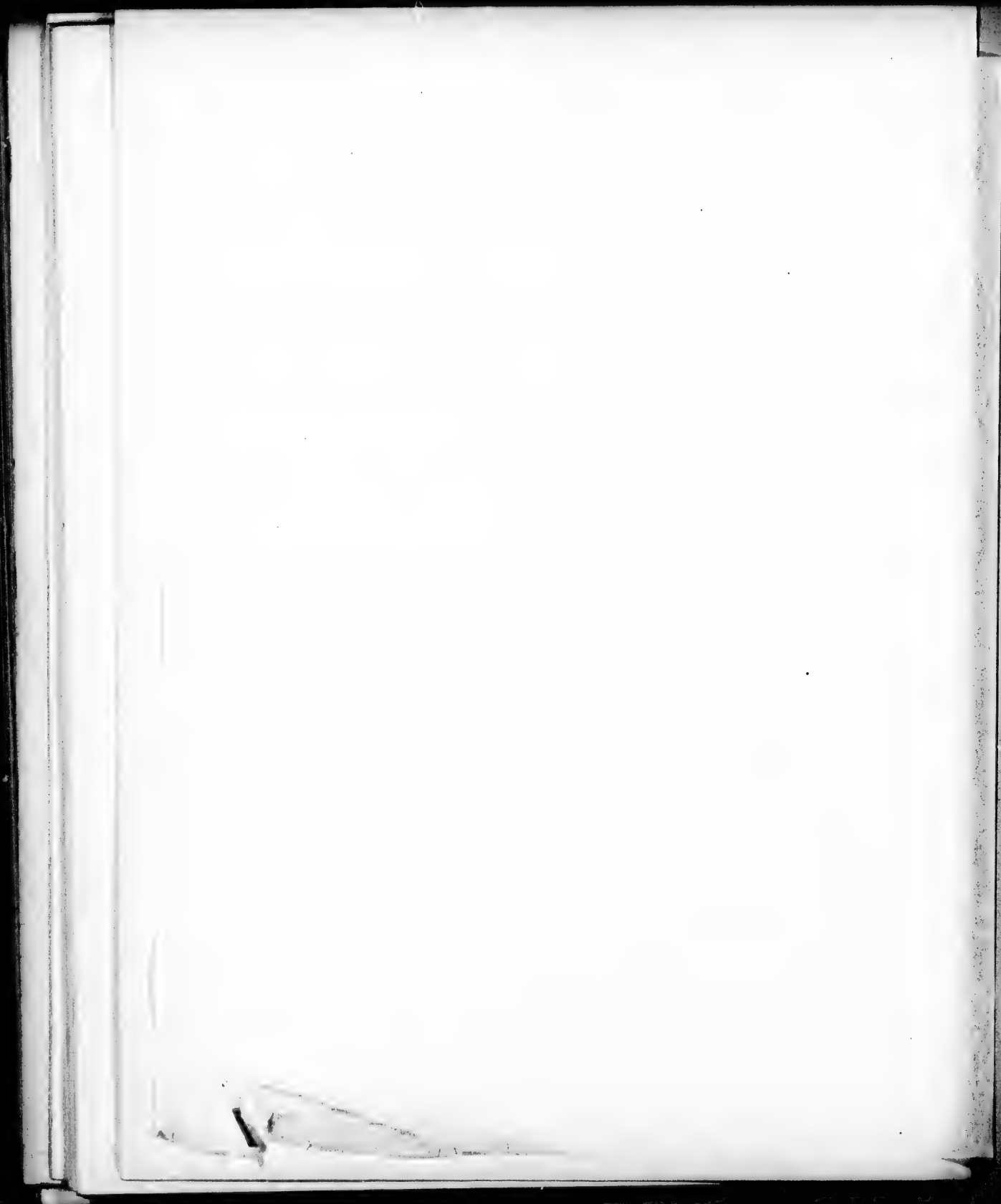
cal law by which all these observations are to be explained and classified,—the law of extreme and mean ratio, as it is called; that is, the dividing a thing into two parts, in such a way that the smaller part shall be to the larger as the larger is to the whole.

In dismissing our lovely flower and the lesson of celestial mechanics to which it has led us, we will pause a moment to catch the song of another poet who has heard the voice of the forest trees.

Pine in the distance,
Patient through sun and rain,
Meeting with graceful persistence,
The north wind's wrench and strain,
No memory of past existence
Brings thee pain;
Right for the zenith heading,
Friendly with heat and cold,
Thine arms to the infinite spreading
Of the heavens, just from of old,
Thou only aspirest the more,
Unregretful the old leaves shedding
That fringed thee with music before,
And deeper thy roots embedding
In the grace and the beauty of yore;
Thou sighest not "Alas, I am older,
The green of last summer is sear!"
But loftier, hopefuller, bolder,
Wins broader horizons each year.

Lowell.

THE CARDINAL-FLOWER.







THE CARDINAL-FLOWER.

LOBELIA CARDINALIS L.

THEN think I of deep shadows on the grass,—
Of meadows where in sun the cattle graze,
Where, as the breezes pass,
The gleaming rushes lean a thousand ways,—
Of leaves that slumber in a cloudy mass,
Or whiten in the wind,—of waters blue
That from the distance sparkle through
Some woodland gap,—and of a sky above,
Where one white cloud like a stray lamb doth move.

My childhood's earliest thoughts are linked with thee;
The sight of thee calls back the robin's song,
Who, from the dark old tree
Beside the door sung clearly all day long,
And I, secure in childish piety,
Listened as if I heard an angel sing
With news from heaven, which he could bring
Fresh every day to my untainted ears,
When birds, and flowers, and I were happy peers.

Lowell.

WE have before us one of our most brilliant wild-flowers.
Nature may almost defy art to reproduce the color with which
she dyes its flaming petals. Nothing comparable to it is seen

FLOWERS OF THE FIELD AND FOREST.

in our native floral domain, and nature does not repeat it in even the brilliant colors of the autumn woods. As splendid and as characteristic as this color is in the Cardinal-flower, it is said to be not quite constant, but occasionally "sports" pink, white, and even yellow.

It is very common in New England, and is indeed distributed throughout the country east of the Rocky Mountains. It always grows on low ground in marshes and by the side of water-courses. It lines the banks of Taunton Great-River for long distances, standing up to its middle in water at high tide, and bending low and swaying heavily as the whelming waves go over its head from the puffing, hurrying little steamers passing by.

The splendid display and contrast of colors which a mass of these flowers make by the side of a clear stream is very striking. The green leaves of the trees are massed behind and above, the grass below, and in the midst this blood-red flower, like tongues of flame, reaching up, the blue sky overhead, and all repeated in the glassy water beneath, make a picture not to be forgotten.

The lines of Dr. Holmes give us a poetical interpretation of some such scene.

The Cardinal, and the blood-red spots,
Its double in the stream;
As if some wounded eagle's breast,
Slow throbbing o'er the plain,
Had left its airy path impressed
In drops of scarlet rain.

The Cardinal-flower grows from two to five feet high, and remains in bloom from July to October, thus both by its size

THE CARDINAL-FLOWER.

and season of flowering, contributing its full share to the beauty of our summer and autumn landscape. It comes in with the heat, and goes out with the frost.

It is said to be easy of cultivation in gardens where moist places may be found into which to transplant it. It seems to be capable of crossing in a wild state with a large blue-flowered species of the *Lobelia*, common in our woods. Examples of hybrids produced in nature which show marked characteristics of both species are not unknown. Whether the hybrids propagate any other way than by shoots I know not.

The genus *Lobelia* comprises some two hundred species scattered over the world, about twenty of which are natives of this country, though strange to say none have ever yet been found on the Pacific coast. Botanically considered, the genus is related to such compositæ as the Asters on the one side and to the Campanulas or Bell-flowers on the other. A comparison of the parts, as for example, of the pistil and stamens with those of the Aster, and the corolla with that of the Bell-flower, would make the relationship apparent to any observer.

Botanists have noticed that many species of *Lobelia* are fertilized by help of insects, as I have had occasion to show is true of several other flowers, whose natural history has been given in this book and in "Beautiful Wild Flowers." But in the Cardinal-flower we have an example of a plant depending upon birds for help in the act of pollenization. As will easily be seen by an inspection of the flower or of the plate, the anthers and partly the filaments of the stamens are glued together at their sides forming a close tube. The pollen is produced on the inside of this and discharged from the open bearded mouth at the end.

FLOWERS OF THE FIELD AND FOREST.

Now the pistil grows up through this narrow tube, and at last protrudes beyond it. At first glance it would seem impossible that the flower should not be self-fertilized. But by looking closer it will be found that the pollen all ripens and falls out of the anther before the pistil grows up to the end of the tube where the pollen is produced. Moreover, the stigmatic surface is on the inside of the two lobes which are made by splitting the end of the pistil down. As the pistil pushes up through the tube, by the anthers, these surfaces are shut close together, face to face, so that the pollen could not possibly reach them. These lobes open and expose their stigmatic surface only when they have protruded quite beyond the end of the pollen-bearing anther tube.

The plate shows not only the position of this organ, but also in the newer flowers at the top the anther tube with no pistil, and, lower down, flowers where the pistil has completed its growth and expanded its yellow-lobed stigma ready for pollenization. Now it is evident that any particular flower must be fertilized by pollen from a flower younger than itself. Associated with this arrangement of parts of which I have spoken are adaptations for securing help in transferring the pollen from the younger to the older flowers, such as a supply of nectar secreted at the bottom of the tubular corolla, and advertised by the brilliant color of the flower. As has been shown by Mr. Darwin, Prof. J. E. Todd and others, in the case of other species of *Lobelia*, bees visit the flowers in search of the nectar, and getting their backs dusted with pollen from the end of the anther-tube which arches out over them, carry it to older flowers where the pistil is ready to receive it.

THE CARDINAL-FLOWER.

According to Prof. Goodale, however, "the Cardinal-flower has so long and narrow a corolla-tube that bees are unable to reach its nectar, which is, moreover, so watery that they do not in this case resort to their frequent expedient of biting through the corolla to get at it. They are replaced by our beautiful ruby-throated humming-bird, which may be seen when the plants are plentiful, gracefully posing itself before one flower after another, while its tongue deftly explores them and removes their sugared stores; but in doing this the bird is continually receiving pollen from the anthers of young flowers and leaving it on the expanded stigmas of those which are older. This is one of the very few cases in which our native flowers are adapted to fertilization by humming-birds; but in tropical America, where these birds are abundant, many flowers are exclusively cross-fertilized by them. Such flowers are sometimes spoken of as ornithophilous, or bird loving.

For most of the following facts concerning the origin of the popular and scientific names of the Cardinal-flower and its history, I am indebted to Prof. Meehan's "Native Flowers and Ferns of the United States." The generic name was given to it more than a century and a half ago by Plumier, who was an ingenious Frenchman, noted for his discoveries among American plants, in honor of Mathias de l'Obel, a famous Flemish botanist of the sixteenth century. Lobel, according to all accounts, was a remarkable man. He was born in Lisle, Flanders, in 1538, and died in London in 1616; was graduated in medicine in Montpelier, practised at Antwerp, became physician to the Prince of Orange, settled in England about 1570, though it appears that he had lived there for a time during early life, and served as gardener to the Earl of

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Zouch, at Hackney, near London. He was subsequently appointed botanist and physician to King James the First. He was the author of several voluminous works on botany, all of which were profusely illustrated. He projected a vast botanical cyclopædia and prepared a portion of it, which was edited and published half a century after his death by Parkinson. It is said that the idea of natural families among plants may be found in Lobel's works.

"The illustrations of Lobel's works can scarcely be recognized now as belonging to the plants for which they were intended." And, in the light of this fact, "it is amusing," says Prof. Meehan, "to find Lobel complaining that the cuts illustrating the work of his predecessor, Mathioli, are so unlike nature, that he thinks this early author must have drawn his pictures in many cases from his imagination."

One may judge of the estimation in which he and his works were held by later botanists, by the fact that it was nearly a century after his death that Plumier named for him this important and interesting genus of plants. We first hear of the Cardinal-flower in Parkinson's "Herbel," published in England about 1630. He says that he had the root of the plant from France, it having been sent over from the New World by the French who had settled in Canada. It is therefore probable that our Cardinal-flower was among the earliest of our native plants to be sent to the Old World, and to receive the admiring attention of botanists there. It no doubt got its popular name in France, as Parkinson seems to say, a name which we can easily suppose was suggested by the resemblance of its brilliant color to the scarlet hat and cassock of a cardinal of the Roman Catholic Church. Parkinson calls it "a very brave" plant, referring,

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of course, to its gaudy or showy dress of scarlet blossoms. And Mrs. Sigourney shows her appreciation of its regal splendor and dignity by picturing the

"Lobelia attired like a queen in her pride."

There are frequent references to this "flower of the scarlet hat" in American poets, and always with recognition of its noble and striking qualities. The floral emblematisers have not been unmindful of its highborn name and nature and have dedicated it to "Distinction." In "Berkshire Wild-flowers" Miss Dora Read Goodale thus sweetly sings its praise :

To the westward burns the smouldering day,
Still and solemn in the sunset sky;
In the purple hollows far away
Shadowy veils of early evening lie,
And the misty mountain tops are gray.

In the stagnant pool, stirred by a breath,
All the shifting light and color lies,
In its shallows, dim with brooding death,
All the sweeping splendors of the skies
Gloss themselves, and scatter light beneath.

Whence is yonder flower, so strangely bright?
Would the sunset's last reflected shine
Flame so red from that dead flush of light?
Dark with passion is its lifted line,
Hot, alive, amid the falling night.

Still it burns intenser as I gaze,
Till its heart-fire quickens with my own,
And when night shuts in the dusky ways
Red and strange shine out the lights of home,
Where my flower its parting sign delays.